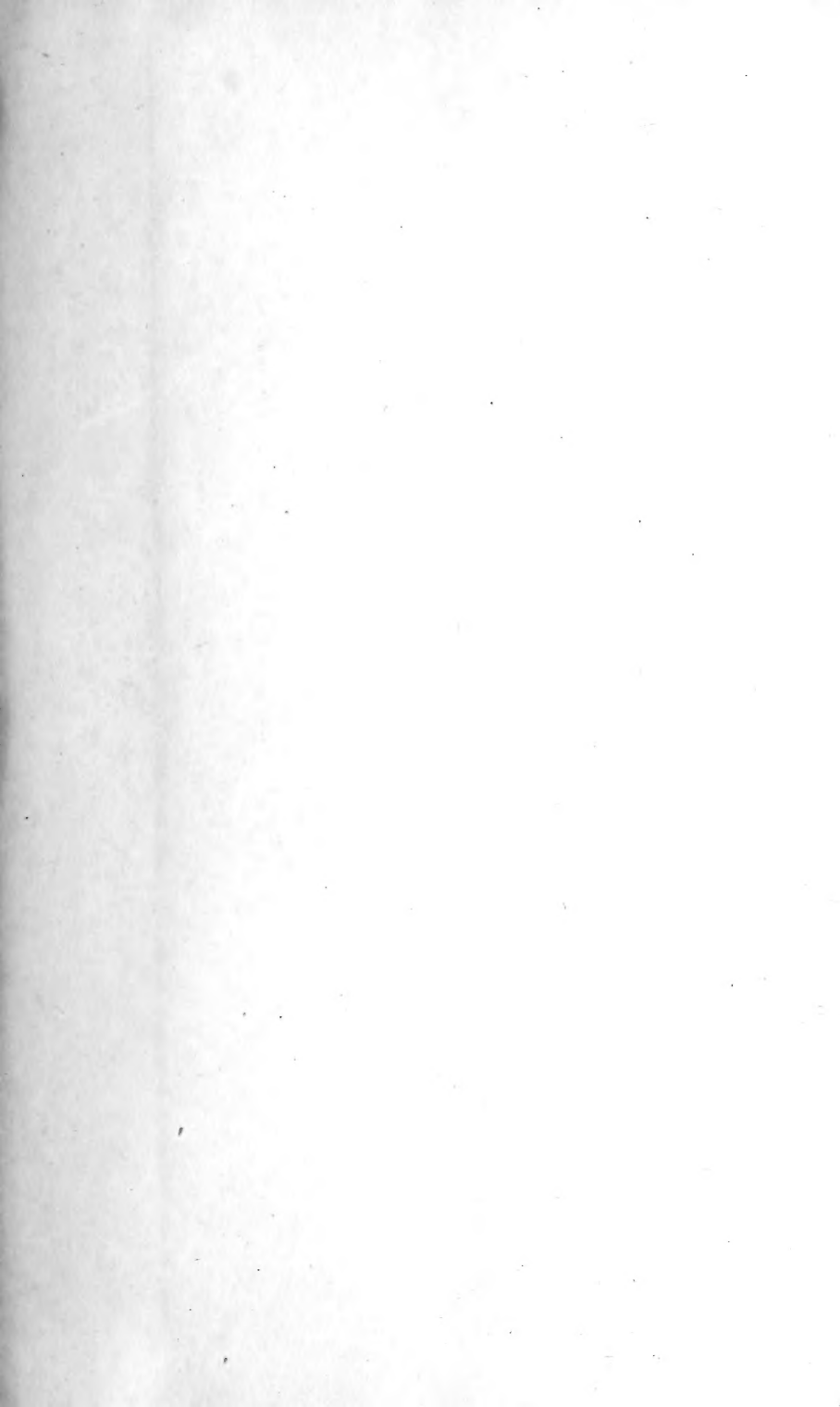


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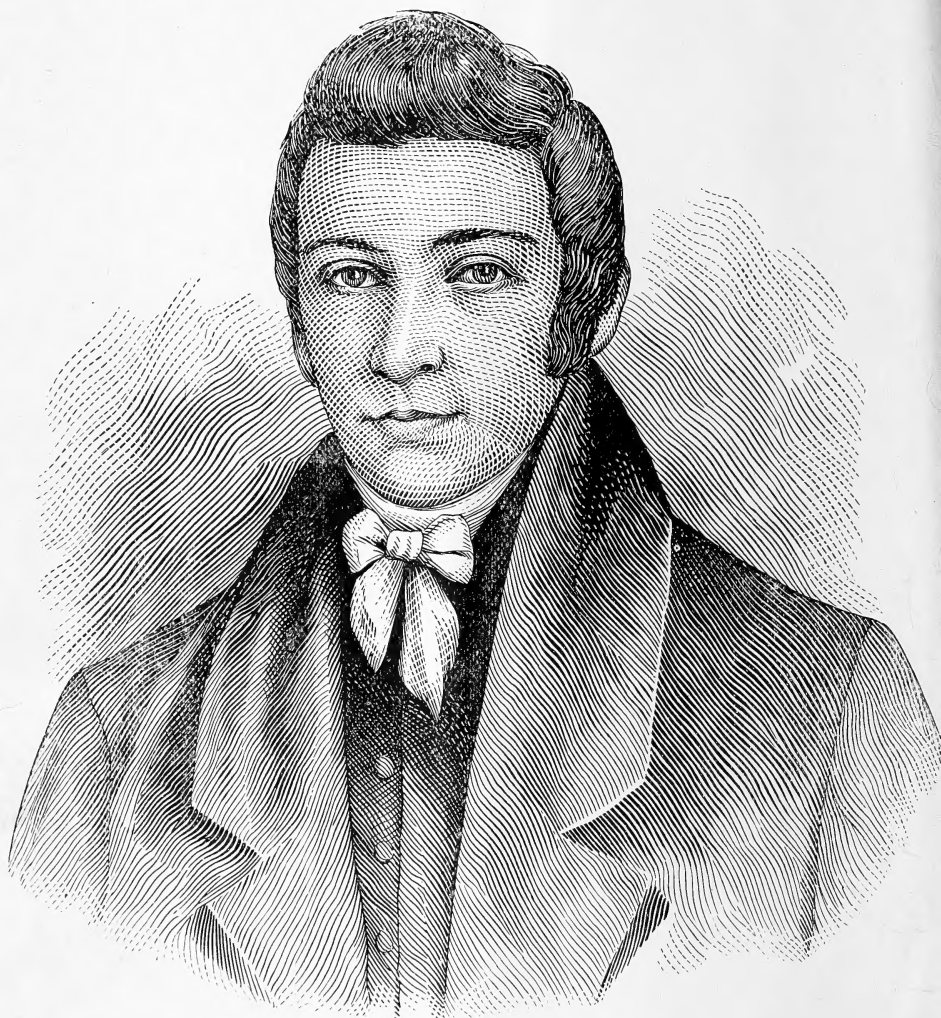
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HENRY TROTH

THE AMERICAN JOURNAL OF PHARMACY

JANUARY, 1895.

HENRY TROTH,

Founder of the Philadelphia College of Pharmacy.

BY JOSEPH P. REMINGTON.

Henry Troth, to whose enterprise and foresight the Philadelphia College of Pharmacy owes its existence, was born in Talbot County, Maryland, September 4, 1794. He was the son of Samuel and Ann Berry Troth, his ancestors being among the early settlers of Maryland. After acquiring such education as circumstances permitted, he came to Philadelphia in 1812, and was apprenticed to Jeremiah Morris, a druggist, in business on the north side of Market Street, below Eighth.

It was toward the close of the war of 1812 that Henry Troth became satisfied that the time had come for him to assume graver responsibilities, and on April 1, 1815, he formed a partnership with his brother-in-law in the wholesale drug business, under the firm name of Henry Troth & Co., locating the new business upon the south side of Market Street, a few doors below Seventh. In 1816 he was united in marriage to Henrietta Henri, of Philadelphia. He had been in business for himself but six years, when the University of Pennsylvania conceived the idea of teaching pharmacy to young apothecaries, and conferred the degree of Master of Pharmacy upon sixteen apothecaries already established in business. This action aroused the independent and progressive spirit of Henry Troth, and he, with his friend, Peter Lehman, called upon the druggists of the city of Philadelphia to defend their right to educate their own assistants, and, the project having been favorably received, a meeting was held in Carpenters' Hall, February 23, 1821. The action taken at

this meeting resulted in the establishment of the Philadelphia College of Pharmacy.

In the meantime the business on Market Street became prosperous, and in January, 1826, Samuel F. Troth, a younger brother of Henry, purchased the interests of Henry's brother-in-law, and thus the brothers became associated in business. As an illustration of his energy and enterprise, in 1835 he built the first five-story store on Market Street; this was regarded at the time as a very advanced step; but Mr. George W. Carpenter, at the northeast corner of Eighth and Market Streets, not to be outdone by a business rival, added two stories to his four-story building, and thus secured the lead in elevation. This incident furnishes a glimpse of the competition amongst druggists more than half a century ago.

Henry Troth's activity was not limited, however, to the demands made upon him by the college and drug business; he had a great fondness for literature, and in 1813 he became associated with Joseph Cooperthwaite, Benjamin M. Hollinshead, Joseph A. Needles, Peter Thompson, Edward Haydock, Samuel Stackhouse, Warwick P. Miller, Thomas Yardley, Watson Jenks, and James Hutchinson, who organized the Philadelphia Literary Association. This became one of the leading societies of its kind, embracing within its membership many of the prominent citizens of Philadelphia, and was an active organization for over thirty years.

Henry Troth was a member of the Orthodox branch of the Society of Friends, and philanthropy and the cause of the oppressed had in him an able champion, for we find him interested in a number of organizations, and for thirteen years he was treasurer of the Pennsylvania Society for the Abolition of Slavery. In addition to this, he served as one of the managers of the Colonization Society, the Children's Asylum, the Almshouse, and the Provident Society.

Through the active period of his life he was one of the Guardians of the Poor, of Philadelphia, a Trustee of Girard College, and one of the Board of Managers of the House of Refuge, from the first year of its organization. The education of the young was always a prominent interest with him; he was one of the organizers of the Apprentices' Library, which still continues its useful work in the community. In the higher field of intellectual activity he was known as a valuable member in the Executive Board of the Philadelphia Museum and Franklin Institute. In commercial and finan-

cial circles, Henry Troth was well known as a manager of the Schuylkill Navigation Company from 1825, and he was also one of the Directors of the United States Bank. From 1827 to 1836, he was a member of Common Council of the City of Philadelphia, and for four years was president of that body.

During the time of his connection with public affairs he became much interested in the use of illuminating gas for lighting the city. This project met with violent opposition from many prominent citizens of Philadelphia. It was gravely contended by engineers and experts that the city would be in danger of being blown up, for the explosive properties of a mixture of this gas and air was then well known, and another objection which was freely urged, was that the water which was conducted by underground pipes through the city, would be contaminated by the pipes conveying the gas in their immediate vicinity. Henry Troth contended strongly against these objectors, and his views were soon sustained, for a company, chartered for the purpose of making illuminating gas, erected works, laid pipes, proved that the grounds of opposition were absurd, and finally sold the works to the city at an advance of 25 per cent.

Henry Troth's progressive spirit was shown in 1819 in his efforts to burn anthracite coal, he being one of the first to attempt it in the city of Philadelphia. The hardness of the "stone coal," as it was called in those early days, seemed to be an insuperable obstacle; this hardness, as is well known, is now recognized as one of its greatest advantages. It is hardly necessary to say that he overcame the difficulty of burning anthracite, and we can well imagine his satisfaction and enjoyment, in after years, in seeing this important product become one of the great sources of wealth of the Commonwealth.

The life of Henry Troth, viewed from the standpoint of the number of years that he lived, was not a long one, for he died May 22, 1842, in his 48th year; but his ceaseless activity, wonderful foresight and correct judgment, caused his labors to be appreciated long after he was laid to rest. In this connection, the words of a contemporary and distinguished professor of the College, written immediately after his death, in an address delivered to the graduates of the College, may appropriately close this brief sketch:

"An individual, once a member of our body, prominent with others, was among the first in his endeavors to promote its success-

ful establishment. In this country it was a new and untried undertaking, but the success with which it has been crowned has long since clearly exhibited the advantages expected by its founders. A foresight of the future, an anticipation of the growing wants of the profession, the necessity of preparation to meet the demands of the community, originated the enterprise. But it required unceasing vigilance, inexhaustible perseverance, widespread influence and unwearied personal attention. For all these our lamented Vice-President Troth was distinguished; he boldly took his stand in favor of improvement, and no difficulties drove him from his path, no disappointment diminished the firmness of his determination to accomplish it. His hope was high and he had the faculty of infusing it into all within his circle. His manly bearing, his practical intelligence, his tones of encouragement and decided liberality, communicated power, and it was wielded for the advancement of this, his favorite project. In speaking of him thus, I detract nothing from the merit of those who stood by him and aided him. I praise him because he is no longer with us, and bring his deeds before our minds, because it is a melancholy enjoyment to dwell upon his memory, more especially in connection with the present ceremonies, in which so often he stood conspicuous. His mantle is among us, and will continue to cover, I trust, many an eminent successor."

SOME FURTHER OBSERVATIONS ON THE STRUCTURE OF SANGUINARIA CANADENSIS.

BY EDSON S. BASTIN.

In *The Pharmacist* for July, 1885, the author published an article on this plant, in which he described the secretion cells and laticiferous tissue of the rhizome.

The following language was used:

"The laticiferous tissue is an interesting subject of study from the morphological standpoint, as in the rhizome it shows every gradation of development from simple, isolated resin- or secretion-cells, through those that are clustered in rows of two or three and those that form an irregular and long chain, but still have a distinct cellular character, to those which form distinct tubes."

A remark of De Bary in which he states that *Sanguinaria* contains no proper laticiferous tissue, but only secretion cells, led to

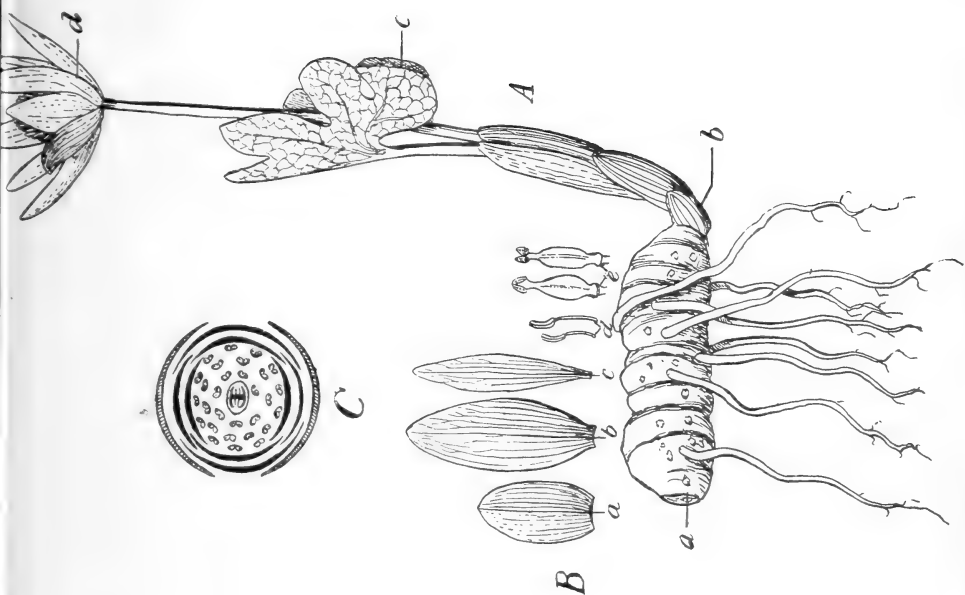


FIG. 1.

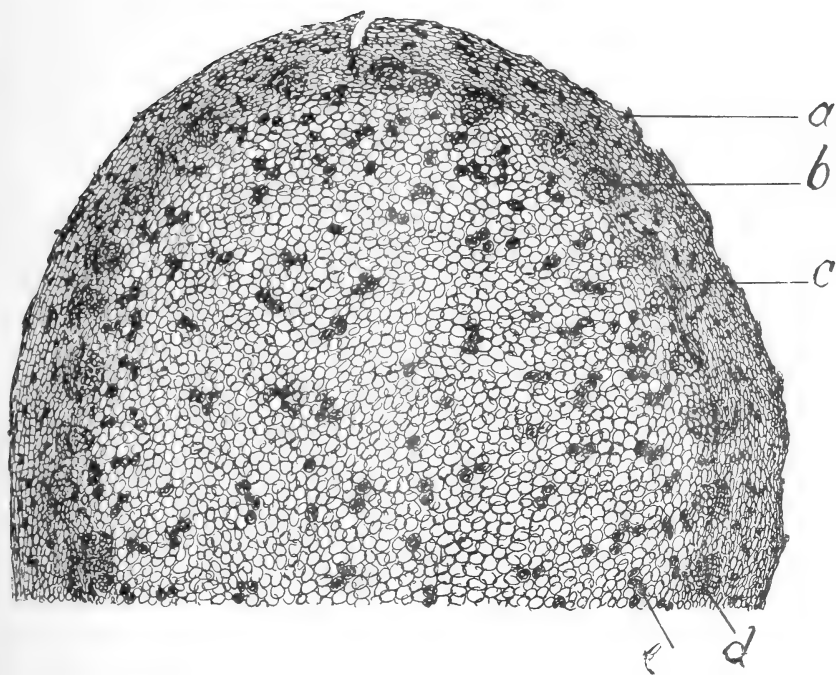


FIG. 2.

this re-investigation of the subject. Fresh materials were procured and a large number of sections, longitudinal and transverse, of the rhizome were made and carefully studied with the view of ascertaining with certainty whether or not milk-tissue, in the proper sense of the term, really does exist in the rhizome.

The red or orange-colored secretion is without doubt chiefly contained in distinct cells, which are either isolated or connected into

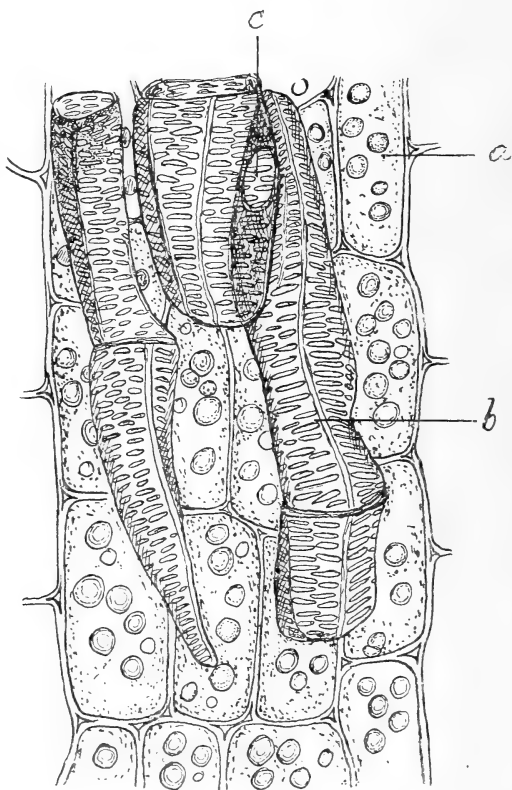


FIG. 3.

irregular chains and distributed among the parenchymatous tissues of the middle bark and large pith. But in the inner portion of the middle bark, and in the inner bark, occur chains of cells which are longer, more regular and contain a yellow rather than an orange-red secretion. The cells composing the chains are also much narrower and more elongated than are the ordinary secretion cells. Among

these rows it is impossible in most instances to demonstrate any communication between the cells. The transverse partitions between the cells are in fact imperforate. In a few instances, however, particularly in the inner layer of the bark, there is demonstrable connection between the secretion cells of the chains, which thus form a true laticiferous tissue, essentially like that occurring in many other

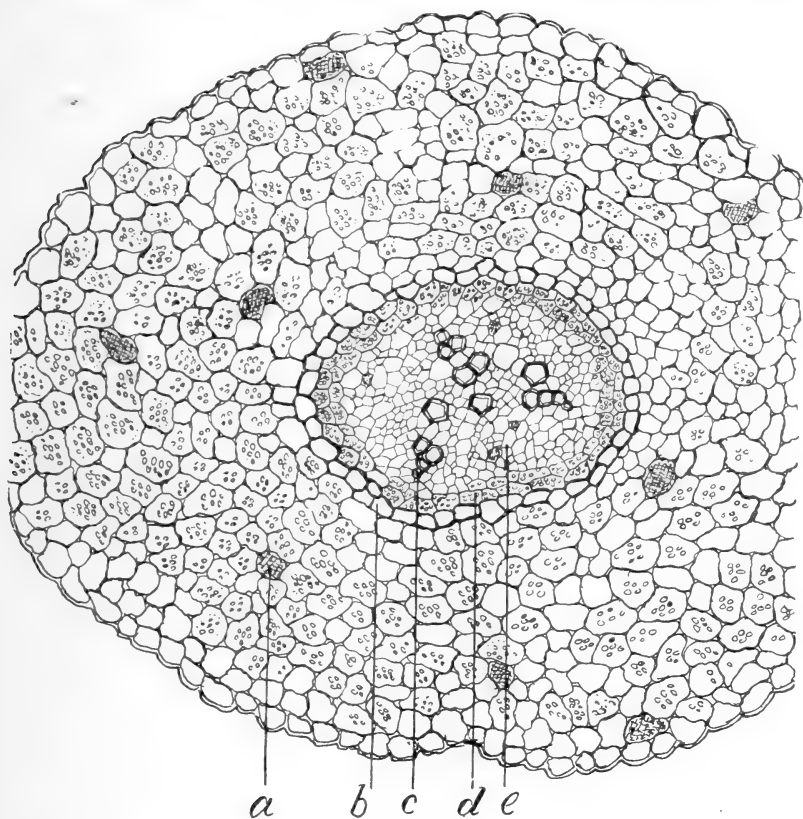


FIG. 4.

of the Papaveraceæ, though of course much less complex in its development. It is seldom the case that these milk-tubes are more than a dozen cells long, and they are seldom branching. In fact we find in this plant the form of laticiferous tissue called "complex," or "reticulate," only in the most rudimentary stages of its development. It plays a very subordinate part in holding the secretions of the plant; but still, to the morphologist it is highly significant, as

showing the relationship existing between secretion cells and complex laticiferous tissue.

That the secretion cells contain resins beside the alkaloidal principles present in the drug, is clearly evidenced by tests. Moreover, it seems probable that the salts of sanguinarine are more abundant in the large orange-red secretion cells of the pith and outer portion of the middle bark, while those of the closely related alkaloid, chele-rythrine, are more abundant in the smaller yellow cells and laticiferous tubes of the inner bark and inner part of the middle bark.

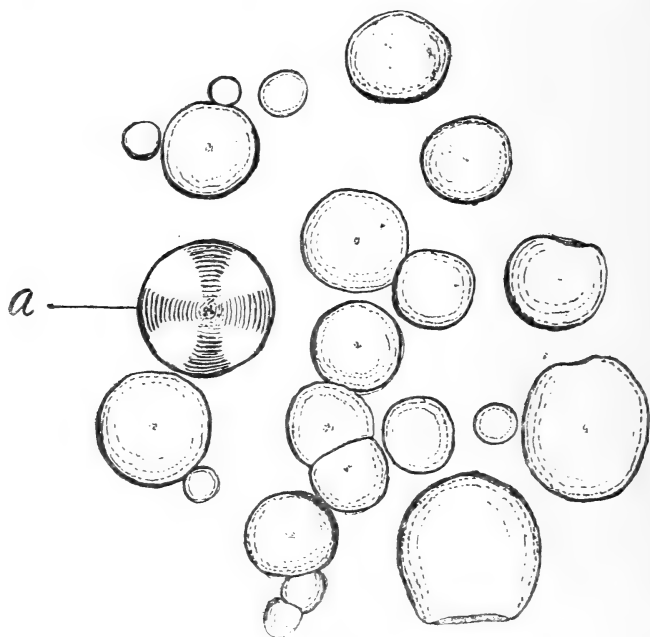


FIG. 5.

Sections treated for twenty-four hours or more with strong glycerin showed deposits in the secretion cells of stellate masses of yellowish-brown crystals, with a decided diminution of the intensity of color in the liquid contents of the cells. The crystals polarize beautifully, but for lack of time their chemical nature has not been investigated.

A number of drawings were made in the course of the study, illustrating further the structure of the rhizome and root. These drawings, together with one from the author's *Laboratory Exercises*,

giving a view of the plant and illustrating its floral structure, are reproduced herewith.

DESCRIPTION OF FIGURES.

Fig. 1.—*A*, Entire plant of *Sanguinaria Canadensis* in its flowering stage. *a*, rhizome and rootlets; *b*, one of the outer bud-scales; *c*, young leaf; *d*, flower complete, except that the caducous sepals have fallen away. $\frac{3}{4}$ natural size.

B, Different floral organs separated. *a*, a sepal; *b* and *c*, different petals; *d*, stamens; *e*, pistil in different views.

C, Ground plan of flower.

Fig. 2.—Part of cross-section of rhizome magnified 15 diameters. *a*, cork; *b*, vascular bundle; *c*, cluster of secretion-cells in middle bark; *d*, cambium; *e*, secretion-cells in pith.

Fig. 3.—Small portion of longitudinal section through xylem of a bundle, showing the reticulate ducts composed of short, irregular cells. *a*, parenchyma cell containing starch; *b*, one of the cells of a duct; *c*, aperture communicating with next cell of the series, forming a duct. Magnification 330 diameters.

Fig. 4.—Portion of the cross-section of a young root of *Sanguinaria*, showing the central radial bundle before any important secondary changes have occurred. The root-bundles are usually triarch or tetrarch, but in older roots the number of rays is much obscured by secondary formations so that the number of rays is difficult to determine. *a*, a secretion-cell; *b*, cell of endodermis; *c*, small duct at end of xylem-ray; *d*, pericambium layer, the cells of which contain much fine-grained starch; *e* phloem mass, in which occur some secretion-cells. Magnification, about 112 diameters.

Fig. 5.—Starch of *Sanguinaria* magnified 1,200 diameters. The grains are spherical or spheroidal, mostly simple, sometimes double; hilum central and usually inconspicuous and unfissured; grains smooth and with no obvious stratification lines; polarization cross faint, equal-armed.

ABIES BALSAMEA, MILLER.

BY CARL G. HUNKEL.

Twigs containing fresh leaves and few cones from this tree were collected by Mr. Cheney,¹ in Buffalo County, of this State, in the month of July, 1893. They were distilled in this laboratory, immediately upon their arrival. The specific gravity and rotatory power of the oil were determined by Mr. Urban, in the beginning of October of the same year. In April of this year, 1894, the physical constants of the oil were again determined. The specific gravity and

¹ Instructor in Botany, University of Wisconsin.

The alkaline liquid was distilled with water vapor. Oil came over clear at first, but toward the close of the operation the distillate crystallized. The crystals were carefully separated and dried on a porous plate. Melting point, 198° – 199° C, in a sealed tube.

The oil was dried with exsiccated sodium sulphate. It was colorless, of a terebinthinate odor, specific gravity 0.8759 at 20° C. In a 100-millimetre tube, it deviated the ray of polarized light 26.47° to the left, hence $(a)_D = -30.22^{\circ}$. The oil was then fractionated for a second time. Toward the close of the operation the oil congealed in the condensing tube, and shortly after removing the flame, the contents of the flask crystallized.

FRACTION 160° – 165° C.

A colorless oil, of a slight terebinthinate, but mixed odor, specific gravity at 20° C. = 0.8798. In a 100-millimetre tube it turned the plane of polarized light 27.15° to the left; hence $(a)_D = -30.86^{\circ}$. Upon analysis it yielded the following results:

- I. 0.2085 gram yielded 0.6280 g. CO_2 = 0.1713 g. C., and
0.2135 g. H_2O = 0.0237 g. H.
II. 0.1873 gram yielded 0.5667 g. CO_2 = 0.1546 g. C., and
0.1942 g. H_2O = 0.02158 g. H.

Calculated for $\text{C}_{10}\text{H}_{16}$	Found	
	I.	II.
C 88.23 per cent.	82.15 per cent.	82.52 per cent.
H 11.77 "	11.38 "	11.52 "
100.00	93.53	94.04

PINENE NITROSO-CHLORIDE.

Since the odor of the fraction reminded one of pinene, the nitroso-chloride reaction was made. Five cubic centimetres of oil were mixed with 5 cubic centimetres of glacial acetic acid and 6 cubic centimetres of ethyl nitrite, and placed in a freezing mixture. To this was added, drop by drop, a mixture of 3 cubic centimetres of glacial acetic acid and 3 cubic centimetres of concentrated hydrochloric acid, and then 5 cubic centimetres of methyl alcohol. The yield of nitroso-chloride was very small, the crystals melting at 101° C. The mother liquid of the nitroso-chloride was then placed in a freezing mixture. Nothing separated after two hours. After twenty-four hours the mother liquid had become brown and crystals

had separated. These were filtered off and the mother liquid set aside again. In all, three crops of crystals were obtained. Their respective melting points were $134\frac{1}{2}^{\circ}$, 135° to 136° , $136\frac{1}{2}^{\circ}$ to $137\frac{1}{2}^{\circ}$. The combined products were so small that nothing more could be done with the same.

FRACTION 165° – 168° C.

A colorless oil of a more distinctly terebinthinate odor than fraction 160° – 165° C.; specific gravity 0.8719 at 20° C. In a 100-mil. limetre tube it deviated the ray of polarized light 27.55° to the left, hence $(\alpha)_D = -31.58^{\circ}$.

BORNEOL.

The crystals which had congealed in the condensing tube during fractional distillation, when dried on a porous plate, were found to have a melting-point of 201° – 202° C. Upon exposing the various fractions to the temperature of a freezing mixture, fractions 168° – 172° C. and 172° – 185° C. yielded more of the borneol. This was collected and crystallized from petroleum ether. The crystals consisted of large shining plates having the characteristic appearance and odor of borneol.¹

ACETIC ACID.

The acid which, by the saponification of the oil, had been converted into a potassium salt was set free by sulphuric acid and distilled off with water vapor. The distillate was neutralized with sodium carbonate, evaporated to dryness, the residue repeatedly extracted with hot absolute alcohol and the hot solution filtered. The filtrate was set aside to crystallize. The crystals were dissolved in a small quantity of water and silver nitrate added. The silver salt, which crystallized in needle-shaped crystals, was drained, washed and dried.

0.19 gram of the salt yielded 0.1215 gram silver.

Calculated for $C_9H_9O_2Ag$.

64.65 per cent.

Found

63.95 per cent.

With considerable degree of certainty it may be said that lævogyrate pinene and lævogyrate bornyl acetate are present in this oil. Bertram and Wahlbaum² attribute the odor of firs to the presence

¹ *Liebig's Annalen*, Vol. 230, p. 226.

² *Archiv d. Pharm.*, Vol. 231, p. 290.

of bornyl acetate, which, according to their statement, is present in almost all of them. As soon as more material can be obtained the investigation will be continued, since the substance that crystallized from the mother liquid of the pinene nitroso -chloride deserves further attention.

PHARMACEUTICAL LABORATORY, UNIVERSITY OF WISCONSIN.

DILUTED HYDROBROMIC ACID.

BY CHAS. H. LA WALL, PH.G.

Diluted hydrobromic acid is one of the articles of the Pharmacopœia for which there is no official process of manufacture, although the Pharmacopœia fixes the standard of purity in a similar manner to the other acids. Notwithstanding the fact that diluted hydrobromic acid is not an article of everyday occurrence in prescriptions, this standard of purity should be as rigorously upheld as that of the more frequently occurring acids.

Some time ago the writer of this article had occasion to examine a sample of diluted hydrobromic acid, which was known to have been made by Fothergill's process. The results of the examination were so widely at variance with the requirements of the Pharmacopœia that other samples were procured from various sources in order to ascertain the purity of the article as commonly found in the market.

Six samples have been carefully examined, all but one of which were from wholesale and manufacturing houses in Philadelphia. Not one of the samples tested complied with all of the requirements of the Pharmacopœia, and while one or two approximated a state of purity, the remaining specimens were very impure, and showed evidence of very careless or faulty methods of manufacture. Free sulphuric acid was present in several of the samples (Nos. 3 and 6), an inexcusable contamination, and all of them indicated a higher percentage of absolute hydrobromic acid than is allowed by the Pharmacopœia.

The tabulated statement of the behavior of the samples with the official tests is as follows :

	Specific Gravity.	Miscibility with alcohol.	Residue left after evaporation.	Precipitate with barium chloride (Sulphates).	Per Cent. of absolute HBr. by titration.	REMARKS.
No. 1 . . .	1'090	ppt.	7'14 p. c.	turbid	11'42	Made by Fothergill's process.
No. 2 . . .	1'077	clear	none	ppt.	10'60	Contained free H_2SO_4 .
No. 3 . . .	1'106	clear	slight	ppt.	14'04	
No. 4 . . .	1'087	clear	1 p. c.	none	11'50	Contained free H_2SO_4 .
No. 5 . . .	1'077	clear	none	ppt.	10'50	
No. 6 . . .	1'080	clear	slight	ppt.	12'72	

The presence of sulphates in all of the samples examined, excepting the fourth, would indicate that impure potassium bromide had been used in their manufacture, or that the acids had been made by Hager's process (*Nat. Disp.*, page 58) and an excess of sulphuric acid used. The former view is more likely to be correct in the cases of samples 2 and 5, as they contained no free sulphuric acid. In the August number of the *AMERICAN JOURNAL OF PHARMACY* for 1894, an article is published entitled "Potassium Iodide and Bromide of the Market—Do They Come up to the Requirements of the Pharmacopœia?" and it is a significant fact that only three of the eight samples of potassium bromide that were examined were entirely free from sulphates.

305 CHERRY STREET, PHILADELPHIA.

A REVIEW OF GAULTHERIN, THE GLUCOSIDE FROM BETULA LENTA, L. —

BY FRANK X. MOERK. PH.G.

At the Pharmaceutical meeting held in the Philadelphia College of Pharmacy, December 4, 1843, a paper was read by William Procter, Jr., entitled "Observations on the Volatile Oil of *Betula Lenta*, and on *Gaultherin*, a Substance Which, by Its Decomposition, Yields That Oil." The important points of that paper may be

briefly reviewed as follows, using, as far as possible, the exact words of the writer: (1) as establishing the identity of volatile oil of *Betula lenta* with the oil of gaultheria, which had shortly before been proved to be methyl salicylate by M. Cahours; (2) establishing the existence of a peculiar principle in the bark of *Betula lenta*, which bears the same kind of relation to the oil of gaultheria or *Betula lenta* that amygdalin bears to the oil of bitter almond, and which was called *gaultherin*, as it gave rise to the oil of gaultheria by its decomposition; the term *betulin* was admitted to be more appropriate, but had already been applied to another substance; (3) the existence in the bark of *Betula lenta*, associated with gaultherin, of a substance enjoying the property of reacting with the latter so as to produce the volatile oil, and which is analogous in its mode of operation to synaptase or emulsin. The constituents of the bark of *Betula lenta* were given as tannin, gum, saccharine matter, resin in considerable quantity, *gaultherin*, fixed oil *soluble in alcohol, etc.* The dry bark does not possess the odor peculiar to the volatile oil, but the latter is only developed by contact with water, recalling the analogous behavior of wild cherry bark. The powdered bark, exhausted by maceration and displacement with cold 95 per cent. alcohol, no longer gives the odor of the oil when moistened with water; the alcoholic solution, evaporated to an extract and mixed with a part of the exhausted bark and water, immediately developed the odor, and by distillation yielded a liquid which gave all of the tests for the oil of *Betula lenta*.

The leaves of *Gaultheria procumbens*, after drying, did not yield the same principle; the leaves, when long kept, lose their odor, and mixture with water does not revive it as with *Betula lenta*; hence, it would seem that the methyl salicylate is an immediate product in the *Gaultheria procumbens*, whilst in the *Betula lenta* it is secondary. To purify this principle, gaultherin, the alcoholic extract of the bark is treated with water, which leaves the resin and fixed oil; the dark red liquid so obtained, containing tannin, extractive and saccharine matter, is then treated with an excess of lead hydrate until these substances are separated and the transparent, nearly colorless liquid obtained by filtration is carefully evaporated. A transparent, gummy mass results, which almost wholly dissolves in 97 per cent. alcohol; the alcoholic solution by spontaneous evaporation yields a syrupy, almost colorless product, which does not crystallize after standing

several weeks. *In this state it is evidently associated with some substance that prevents its crystallization.* The syrupy liquid was agitated with several times its bulk of ether, but the former separated from the mixture unchanged. The difficulty of combining gaultherin with other bodies opposes a barrier to its examination.

As thus obtained, gaultherin has little if any odor and a slightly bitter taste; heated carefully on a glass plate until all the moisture has evaporated, it remains as an easily pulverizable, varnish-like layer, which may be heated to 300° F. without change; at 400° F. it is decomposed, oil of gaultheria being among the products. Distillation with diluted hydrochloric and sulphuric acids gave rise to the volatile oil; diluted nitric acid gave minute yellow crystals, similar to those obtainable from the oil.

The fixed alkalies and alkaline hydrates wholly destroy the power of generating the volatile oil, and convert gaultherin into an acid (gaultheric acid), which remains combined with the base. Ammonia has but slight action upon gaultherin, as, after boiling, it still is capable of producing the volatile oil by reaction with the residue of the bark.

Gaultherin boiled with lead hydrate and water is but slightly decomposed, yielding a filtrate having an alkaline reaction and containing lead; by the cautious addition of sulphuric acid and filtering off the lead sulphate, there is obtained an acid solution which contains no sulphuric acid.

Gaultherin in aqueous solution, made alkaline with ammonia, is precipitated by lead subacetate, but appears to be converted into gaultheric acid or otherwise decomposed, as neither the liquid filtered from the precipitate nor that obtained by decomposing the precipitate with dilute sulphuric acid would yield the volatile oil when mixed with the residue of the bark. *Gaultheric acid* is obtained by dissolving gaultherin in baryta water, boiling the solution for a short time, and afterward passing a current of carbonic acid gas through the liquid until all free baryta is removed, and then filtering. A neutral solution of gaultherate of barium is obtained, from which the free acid may be isolated by the cautious addition of dilute sulphuric acid, as long as a precipitate is produced. The filtered liquid is strongly acid and does not precipitate baryta water; by evaporation it dries into a gum-like mass. In this form it is impure. By boiling it with lead carbonate until saturated, filtering

and precipitating the lead with hydrogen sulphide, a solution is obtained containing the acid in a much purer state, which, by evaporation, yields it in a nearly colorless mass with some evidence of crystallization. Gaultheric acid is soluble in water and alcohol, but is only slightly taken up by ether. It saturates bases, forming neutral salts which do not crystallize. By distilling it with dilute sulphuric acid, oil of gaultheria is obtained, and nitric acid appears to act on it like gaultherin.

The substance existing in the residue of the bark, after exhaustion by alcohol, and which reacts with gaultherin to produce the volatile oil, has not been isolated. It is insoluble in water, as by long maceration in that fluid it is not removed or changed. The temperature of ebullition, as well as maceration in solution of potassa sp. gr. 1.05, destroys its power of acting upon gaultherin. The impossibility of finding a menstruum capable of dissolving this principle, has prevented a further examination of its properties.

It will be interesting to know the ultimate composition of this principle and the relation it bears to gaultheric acid and methyl salicylate; before that can be accomplished, the necessity of obtaining it in a pure state is imperative. It is hoped that the attention of chemists will be attracted to these principles, and their character more fully developed.

Just about fifty years have elapsed since the publication of the above experiments without any further investigation being recorded. In *Archiv der Pharmacie*, 1894, page 437, there is to be found the second publication bearing upon this subject, by Dr. A. Schneegans and J. E. Gerock. These writers have taken as their field of labor the separation and properties of glucosides which, by their decomposition, yield volatile oils. Their first paper bearing upon the volatile oil of *Spiraea ulmaria* was published about two years ago. The results of this investigation, while not as successful as anticipated, disclosed that several glucosides were present, which, by their decomposition, yielded salicyl-aldehyde, as well as methyl salicylate, but the quantities of these glucosides which are present was very small, so that their preparation in a state of purity was not successful.

Turning their attention next to the glucoside yielding methyl salicylate which appeared to offer more promising results, the bark

of *Betula lenta* was taken for investigation. Preliminary experiments established the absence of preformed volatile oil; the 94 per cent. alcoholic tincture, always possessing the odor of wintergreen, indicated the unexpected decomposition of the glucoside in strong alcoholic solution; to prevent this decomposition the bark was extracted with lead acetate (15 per cent. of the weight of the bark) in strong alcoholic solution, whereby the ferment is rendered inactive. Such a tincture possesses no odor of wintergreen. After precipitating the lead with hydrogen sulphide, the liquid is concentrated by distilling off the alcohol; the brown syrupy residue is taken up in absolute alcohol, filtered from the insoluble substances, and the filtrate mixed with several volumes of ether, when a voluminous white precipitate is produced, which agglutinates to a yellow, plastic mass. This, redissolved in alcohol and allowed to evaporate spontaneously, forms a thick liquid, in which are slowly formed star-shaped groups of short, prismatic crystals. The crystals, separated by suction from the mother-liquor (this by exposure for several months to low temperature did not separate any additional crystals; it consisted almost entirely of a reducing sugar, and contained but traces of gaultherin, as distillation with dilute acids failed to give appreciable quantities of the oil), and recrystallized several times from alcohol after digesting with animal charcoal, were obtained as colorless, crystalline needles. The name gaultherin is retained for the same reasons given by Procter.

Gaultherin is quite, although in the crystallized condition only slowly, soluble in water; also soluble in alcohol and concentrated acetic acid without decomposition; ether, chloroform, acetone, benzol, do not dissolve it. Concentrated sulphuric acid dissolves it, with a pale rose color, changing quickly to brown and black. It does not melt without decomposition; a little above 100° C. the odor of gaultheria becomes perceptible, and at 120° C. it commences to become brown. The freshly prepared aqueous solution is not colored by ferric salts even after boiling. Fehling's solution is not reduced in the cold, but quickly upon boiling. Heated with small quantities of mineral acids, the odor of wintergreen is recognizable, and the fluid becomes milky, and, if sufficiently concentrated, deposits heavy, oily drops; the solution then quickly reduces Fehling's solution.

Gaultherin, in aqueous solution, is lævogyre; it possesses a purely

bitter taste, therefore is not decomposed by the ferments of the saliva ; it is not decomposed by emulsin or diastase. Decomposed by dilute mineral acids, it yields only two products, *sugar* and *methyl salicylate*. Moist gaultherin is slowly decomposed, as is shown by the faint odor of wintergreen which such specimens show after a few days ; the aqueous solution, heated in a closed tube to 130° – 140° C., gives the above-mentioned two decomposition products.

The glucoside crystallizes with a molecule of water, which is only in part given off if kept over sulphuric acid or dried at ordinary temperature or with moderate heating ; drying at a somewhat higher temperature brings about its decomposition, so that combustions made with the crystals dried under different conditions show a variation of as much as 2 per cent. in the amount of carbon. After ascertaining the cause of these variable figures, two combustions were made, giving the following composition :

	I.	II.	Calculated for $C_{14}H_{13}O_8 + H_2O$
C	50'31	50'28	50'60
H	5'99	6'22	6'02

Procter's preparation in all probability consisted chiefly of sugar ; the formation of gaultheric acid (which see in the previous part), by boiling with baryta water, as stated by Procter, was repeated with the crystallized gaultherin, but with very different results. Baryta water, in the cold, will decompose gaultherin after a short time ; heated to the boiling point the glucoside is decomposed with the saponification of the methyl salicylate so that the solution contains methyl alcohol, barium salicylate and sugar ; what was called gaultheric acid, therefore, is a mixture of sugar and salicylic acid, and all of the properties ascribed by Procter to this acid are due this mixture, save one, which is not explainable, namely, the formation of oil of wintergreen by distilling the so-called gaultheric acid with dilute sulphuric acid. If the proof of this consisted in testing the distillate with a ferric salt, instead of actually observing the oil, even this is explainable, as salicylic acid will volatilize with the steam.

Without attempting the isolation of the ferment, which brings about the decomposition of the gaultherin, the statement of Procter, that the ferment is insoluble in water, is discredited, on the ground

that moistening the powdered bark develops almost instantly the odor of wintergreen. Attention is called to the development of the wintergreen odor in the alcoholic tinctures, and that the indicated decomposition of the gaultherin continues during the evaporation of the solutions. A complete decomposition of the glucoside during the evaporation was, however, never observed. To prevent this decomposition various experiments were made to render the ferment inactive; drying the powder at 110° C. for some hours, and the employment of mercuric chloride solution, were without effect; adding the powdered bark to boiling water somewhat interfered with the ferment, as decidedly smaller yields of volatile oil were then noticed; the use of lead acetate proved to be the simplest and most reliable method of preventing the decomposition of gaultherin by the ferment. (This, possibly, is then the explanation of the remarkable behavior of gaultherin noticed by Procter when he added lead sub-acetate to an ammoniacal solution of gaultherin and tried the effect of the original filtrate and of the filtrate resulting from the decomposition of the precipitate with dilute sulphuric acid upon some of the exhausted bark without getting the odor of wintergreen from either solution.)¹

An extended chemical investigation of gaultherin was intended, but was frustrated by the disappointingly small yield of gaultherin from a second lot of bark imported especially for this work; the cause of this small yield cannot be positively stated, as it may be due to the time of collecting the bark or to a decomposition of the greater portion of the glucoside by some unknown cause.

FLESH IN PHARMACY.

BY WILLIAM B. THOMPSON.

Gland extract, and its utility as a therapeutic agent, is just now a debatable subject in medical circles. When experiment, observation, and experience establish something definite, and this is favorable, the pharmacist may prepare for an era in animal products. We do however have some connecting links with this series of actual body parts as internal remedies—in musk, castor and fel bovis—to which might be added cod liver oil; but a revival such as is discussed would almost seem like a return to the cauldron

¹ See previous part of this paper.

contents of Macbeth's weird witches' stew! and, seriously, the idea of the substance of a gland from an animal in health being used to effect a cure of a disease supposed to be due to the interrupted function of a similar gland in another body, has something about it of the *similia similibus* certainly. Animal physiology (human) divides the glands into two groups—the secreting, or those having ducts, and the non-secreting, or ductless. The secreting glands all have outlets to the surface of the body. These diversified secretions can be collected and an analysis determine their character; but how is it with the ductless glands? These are none the less component parts of the physical structure, and perform certain wise and benign functions in the human economy. They do give to the body sustenance and support in some appreciable way, but not in a manner of which we have exact knowledge. In this they differ essentially from the former class of glands. An analysis of their substance gives only the usual flesh constituents. We can discover in them no special or unusual element. How then can we intelligently apply and use them? Such application would seem to be quite similar to taking the "hair of the dog that bit you" to heal the bite. The attention which this subject has already elicited will arouse a yet stronger interest, and the evidence of "things seen" will be eagerly sought; then, possibly, the pharmacist may place side by side with his jars, "unguenta," a flesh-pot or two labelled "Extractum carnis humanæ," or "animalis"!

One merit, however, there will be in the gland treatment for the apothecary, and it is this, that, to maintain repair, the remedy must be maintained, and the original prescription will be necessarily renewed *ad infinitum*.

THE FLORIDA SPONGE INDUSTRY.

BY WILLIAM B. BURK.

Sponge is a substance with which almost everyone is familiar, as there are but few living in civilized communities who do not find occasion to use it for a great variety of purposes. The article is so very useful that a large number of inconveniences would arise if it could not be obtained. Without it, what would the surgeon, the traveller or the housekeeper do? And yet, most of those who use sponges in an infinite variety of ways all their lives, never stop to

consider how they are formed ; that is, whether they are plants or animals, or what their history or habits may have been.

Sponges consist of a framework or skeleton, coated with gelatinous matter and forming a non-irritable mass, which is connected internally with canals of various sizes. The ova are very numerous, and present in appearance the form of irregular shaped granules derived from the gelatinous matter which grow into ciliated germs, and, falling at maturity into small canals, are then expelled through the orifices. When alive, the body is covered by a gelatinous film, which, being provided with cilia, causes a current of water to pass in at the smaller pores and out at the larger apertures, the sponge probably assimilating the nutritive principles contained in the water.

Sponges are found abundantly in tropical waters, generally. They gradually decrease in numbers towards the colder latitudes, till they become entirely extinct. They vary much in shape. Some are shaped like a vase, others are semi-cylindrical, others flat like an open fan, and some are round.

The commerce in sponges is of considerable importance. The great difficulty which is experienced in any attempt to distinguish species, results from the extreme susceptibility of all keratose sponges to any change in external conditions. They appear to require, for the production of the forms in abundance, tropical or sub-tropical seas, and attain by far their greatest development in the number of the forms and species in the Gulf of Mexico and West Indian seas. The typical forms, the commercial sponges, are essentially confined to the waters of the Bahaman Archipelago, and the southern and western coasts of Florida in the Western Hemisphere, and to the Mediterranean and Red Seas in the other.

The Florida sponge grounds form three separate and elongated stretches along the southern and western coasts of the State. The first includes nearly all of the Florida reefs, the second extends from Anclote Keys to Cedar Keys, and the third from just north of Cedar Keys to Saint Mark's. The Florida grounds have a linear extent of about 120 miles, beginning at Key Biscayne, in the northeast, and ending in the south at northwest channel, just west of Key West. The northwestern half of the grounds is very narrow, having an average width of only about five miles, and being limited to the outer side of the reefs. At about the Matacumbo Reefs the grounds

broaden out so as to cover the entire width of the reefs, which are much broader here than at the north. The entire southern half of the grounds has more or less of the same breadth, which is about 13 or 14 miles. The second sponging ground begins just south of Anclote Keys, with a breadth of 7 or 8 miles, which it maintains from a point opposite Bat Fort to Sea Horse Reef, just south of Cedar Keys. The total length of this sponging ground is about 60 geographical miles. Its distance from the shore varies somewhat. At the south the inner edge approaches within 4 or 5 miles of the main land, and comes close upon Anclote Keys; but throughout the remainder of its extent it is distant 6 to 8 miles from the shore until it touches the shallow bottom and reefs of Cedar Keys. The depth of water on these grounds, as indicated on the coast survey charts, ranges from 3 to 6 fathoms, but many portions are undoubtedly shallower than this. The northern ground, which maintains a nearly uniform width throughout, is about 70 miles long by about 15 miles broad. It approaches to within about 5 miles of the shore and terminates just off the mouth of Saint Mark's River; the depth of the water is the same as upon the next one to the south, *i. e.*, from 3 to 6 fathoms. The total area of the Florida sponging grounds, which are now being worked, including also those that were formerly fished upon but have since been more or less abandoned, may be roughly stated at about 3,000 square geographical miles. This probably does not include all of the sponging grounds occurring in Florida waters, for the fact that new areas are being constantly discovered would indicate that there might still be more to find, and it is certain that no strenuous efforts have yet been made to extend the grounds already known, the discovery of new ones having generally been made by accident.

The sponge fishery of the Florida coast differs from that of the Mediterranean, in that sponges are not obtained by divers, but by means of a long hook fastened to the end of a long pole, and managed from a small boat. In Florida, small vessels, of from 5 to 50 tons measurement, are employed to visit the grounds to afford quarters for the men, and to bring home the catch. These vessels are generally of light draught and schooner rigged, having proportionately large decks on which to carry boats, working gear and the sponges caught. The holds are of considerable size for storing the sponges, and the cabins generally small, indicating a sacrifice of comfort to

working room. Each vessel carries, according to its size, from five to fifteen men, one as cook and the remainder as fishermen, and also a small yawl boat to every two fishermen, to be used by them in securing the sponges. In addition to the working tools for taking sponges, they are provided with a sufficient quantity of provisions, wood and water for the trip, lasting from four to ten weeks.

The working outfit for a Florida sponging vessel consists of a few small yawl boats, called dingies, and a supply of sponge hooks and sponge glasses. The boats used are always made as light as possible. They are from 15 to 20 feet long, and from 4 to 6 feet wide. The idea is to have the boats light enough to enable two men to haul them in and out over the side of the vessel, and yet strong enough to withstand the rough handling, which they are sometimes subjected to, and to carry the heavy loads resulting from a day's catch. While catching sponges it is necessary to scull the small yawl boats (dingies) from the stern, and, for convenience in doing so, this form of sculling notch is used: A piece of oak plank, about 6 inches wide and 1 foot long, is notched at one end to fit the oar and inserted at the other between two guiding strips well fastened to the stern sheet. This sculling notch is placed at one side of the centre of the stern sheet, and is made to be easily removable in order that it may be taken out of the way when not needed. The sponge hooks are made of iron, with three curved prongs, measuring about 5 to 6 inches in width. The entire length of a hook is about 8 inches, the upper end being made into a very strong socket for the insertion of the pole.

The sponge glass is made from an ordinary wooden bucket, the wooden bottom being replaced by one of ordinary window glass, securely fastened by cement. In using a sponge glass it is placed upright on the surface of the water, the handle of the bucket is placed on the back of the neck of the fisherman with his head thrust down in the bucket. In this way the fisherman can distinctly see very small objects in very deep water, and he can easily distinguish good sponges from those of an inferior grade.

When the sponger discovers a suitable sponge, through the aid of the sponge glass, he hurriedly grasps his hook, and, plunging it directly upon the sponge, he skilfully pulls it from its habitation and brings it up to the surface and places it in the boat. As soon as the fisherman collects a sufficient quantity, he takes them to the

vessel, where they are spread carefully on the deck in their natural upright position, so as to allow the slimy matter, called "Gurry," by the sponger, to run off. During the first stages of decomposition they have a very unpleasant odor, something like decayed fishy matter. After the dingies collect sufficient sponges to make a vessel load, they are taken to what are called sponge crawls, which is an enclosure of about 10 to 12 feet, made generally by placing stakes in the beach where the water is from 2 to 3 feet deep.

Sponges, after being kept on the decks of the vessel from one to two days, will generally be sufficiently cured to be taken to the crawls, and then they are kept there for a few days and then thoroughly washed and pounded with a flat stick. They are then placed upon strings of about 6 feet in length and taken to the markets, where they are sold at auction. They are generally sold in lots, and then carefully trimmed and packed in bales weighing from 15 to 100 pounds each, according to quality, the cheaper grades being generally packed in the larger bales.

The principal varieties of sponges found in Florida are the following: Sheep-wool, yellow and grass. The Florida sheep-wool are the best quality, being of very fine texture, soft and very strong and durable. The yellow sponge is of fine quality, but not strong in texture, and not near as soft or durable as the sheep-wool sponges. The grass is very much inferior to the others, not being as strong nor so desirable in shape, and being easily torn.

There are no sponges found in the world to equal the Florida sheep-wool for softness and strength, and no better bath sponge can be found than a good, solid Florida sheep-wool, although they are generally sold for washing carriages, etc. In former years Florida sponges were loaded with lime or sand in order to decrease the price, but of late very few loaded sponges have been placed upon the market.

Sponges in great variety are also found in many places in the West India Islands, also in Cuba. The Cuban sponges are the next best to the Florida. The principal varieties found in Cuba or the West Indies are sheep-wool, reef, yellow and grass, also velvet, which are next best to the sheep-wool.

The finer grades of sponges are found principally in the Mediterranean, such as the fine surgeon's, toilet, bathing and nursery sponges, and they are very much higher in price than any others.

Florida produces nearly double the amount of sponges that are imported from all other countries; that is, in value, not quantity, and the demand for good Florida sponges is considerable greater than the supply. Consequently, the prices must advance from year to year. The prices have more than doubled, within the last twenty years, for Florida sponges.

The fine, soft species of sponges, such as surgeon's, toilet, nursery, bath, etc., are found in great variety in the Mediterranean, and are fished principally by divers, sometimes at great depth. After being brought to the land they are buried in the sand and allowed to decompose, after which they are well washed and beaten with a small stick, and then packed in bags and sent direct to London, and again thoroughly cleaned and packed in cases according to size and quality. The large London dealers have almost complete control of the sponges found in the Mediterranean. There are a great many varieties found there, principally the fine surgeon's, toilet, bathing, potter's, fine thin flat, (called elephant's ears by the native fishermen), fine cups, Zimocca toilet, Zimocca potter's, etc. Some of the finest cup sponges are sold at as high as \$100 per dozen. The Mandruka bath sponges are also very expensive and very rare. Some of the cheaper species are also found in the same waters, but none like those found in Florida or Cuban waters.

LABORATORY NOTES.

BY LYMAN F. KEBLER.

PURE DELAWARE HONEY.

It is considered by some that a standard for pure honey is not hard to fix, while others consider the task somewhat more difficult. Theodore Weigle¹ in his report, at the tenth annual meeting of the Independent Association of Bavarian Representatives of Applied Chemistry, stated that there had come to the public notice an artificial honey which so closely approximated the genuine product, both physically and chemically, that it was impossible to distinguish it from the real article. Nor is this an isolated case, but is amply supplemented by every tabulated examination of honey, conspicuous among which are the honeys reported in Bulletin Agr. Dept.,

¹ *Deutsche Zuckerindustrie* 16, 1043.

Wash., D. C., No. 13, part 6, where we frequently find such appellations as "apparently adulterated," "apparently genuine."

In deciding whether a honey is a natural product or not, we must call into question every recognized qualification a pure honey should possess, and then we are occasionally unable to make an absolute decision.

Pure honey is the nectar of flowers and other saccharin exudations of plants, collected by bees and stored in cells built, in part at least, by the bees themselves. The source from whence the honey is collected is of no small importance.

Honey may vary in color from a water white to a black, is generally levorotatory, rarely exceeding -20° at 20° C. Contains from 12-20 per cent. of water, from a mere trace to 0.30 per cent. of ash, from 60-75 per cent. of reducing sugar, from 0-10 per cent. of sucrose, and a microscopical examination should reveal the presence of pollen grains. The U. S. P. requires a limit of chlorides and sulphates.

Recently there came to my notice a number of samples of honey containing an excess of chlorides. From this it was concluded that the honey had been adulterated with glucose prepared through the agency of hydrochloric acid. During a conversation with the producer I learned that the honey had been accumulated from a "salt marsh." Thinking that this environment might account for the excessive quantity of chlorides, I made a complete examination with the following results: color light yellow, all were levorotatory (-1.85° to -2.82°) at the normal temperature; average percentage of water 16.13 per cent.; ash 0.25 per cent.; reducing sugar 68.19 per cent.; an abundance of pollen grains; sulphates, a trace; chlorides excessive; and the honey would not comply with the absolute alcohol test which, in my opinion, is an excessive requirement. I have not found a single honey in over one hundred samples that would comply with this test rigidly. Dextrin is the principal ingredient this test endeavors to eliminate. G. L. Spencer¹ has shown that pure honey may contain as much as 4 per cent. of dextrin, and E. von Raumer² has demonstrated that honey dew contains a large percentage of dextrin which frequently finds its way into honey during certain portions of the year.

¹ 1892, Bull. Agr. Dept., Wash., D. C., No. 13, 808.

² 1894, Ztschr. anal Chem., 33, 397.

From these data I was convinced that the above samples represented natural products.

PYROGALLIC ACID.

Three well-known brands of pyrogalllic acid gave me the following melting-points: A, 116—118° C.; B, 116° C.; C, 117° C. After applying the ferric chloride, ferric acetate, lime water and pine wood moistened with hydrochloric acid tests I was unable to make a definite decision as regards the purity of the products. Recent authorities inform us that pyrogalllic acid melts at 131° C., while catechol melts at 111° C. Judging from the melting points it is quite probable that the samples were mixtures of pyrogalllic acid and catechol.

LIGHT OIL OF WINE.

It seems almost inconceivable to what depths the finite mind will stoop deliberately to defraud his fellow man for a little pecuniary gain. I was forcibly convinced of this while examining a number of samples of light oil of wine. The price varied from 80 cents to \$4.50. The following table contains the results of the examination:

Sample.	Sp. Gr. at 15° C.	B. P.	Reaction.	Color.	Odor.
1	0.819	90-135	Neutral	Yellowish	Fusel Oil
2	0.850	70-141	Acid	Colorless	Ethereal
3	0.828	50-154	Neutral	Yellowish	Ethereal
4	0.864	76-135	Acid	Colorless	Ethereal

Number *one* was unadulterated fusel oil. Numbers *two* and *four* were mixtures of ether, alcohol and small quantities of heavy oil of wine. Number three was, approximately, a mixture of equal parts of commercial ether and heavy oil of wine.

OIL OF SASSAFRAS.

Oil of sassafras begins to boil¹ at 115°² and gradually rises to 235° C. Specific gravity from 1.070 to 1.080° at 15° C. Equal parts of the oil and nitric acid produce a violent reaction with a red

¹ Ladenburg's Handwörterbuch der Chemie, 8, 320.

² Probably a little low.

color ; the oil is finally converted into a resin. The table below contains the results on ten samples of oil :

Sample.	Sp. Gr. at 15° C.	B. P.	Color.	Reaction.	Nitric Acid Test.
1	1'0680	210-234	Colorless	Neutral	Normal.
2	1'1006	230-236	"	"	"
3	1'060	190-236	"	"	"
4	1'053	195-231	"	"	"
5	1'077	200-233	"	"	"
6	1'053	176-232	"	"	"
7	1'050	192-234	"	"	"
8	1'054	179-231	"	"	"
9	1'076	180-232	"	"	"
10	1'075	215-233	Yellowish	"	"

Numbers *one, five, nine* and *ten* approximately comply with the U. S. P. requirements, number *two* is commercial safrol and of the remaining five, probably all but number *two*, are the so-called pseudo-sassafras oil, or "artificial sassafras oil," produced by fractionating camphor oil.

IPECAC ROOT.

The following observation is worth a passing notice in that it scores a point for assaying with volumetric acid solutions. Two samples of ipecac root were assayed according to Mr. C. C. Keller's process. The thick annulated root, generally called "Fancy Root," yielded by the gravimetric process 1.67 per cent., by titration with volumetric acid solution 1.62 per cent. of alkaloid. The "Wiry Root" by the gravimetric process gave 2.39 per cent., by titration with volumetric acid solution 2.33 per cent. of alkaloid.

One hundred and two pounds of the "Wiry Root" were percolated. Before the fluid extract could be completed, it was necessary to utilize a portion of it. Accordingly, the product was assayed and the desired quantity was removed. This assay yielded 2.18 per cent. of alkaloid, a loss of 0.15 per cent., or 14.94 gallons when the product is finished. We were again compelled to remove a portion of the fluid extract before it was finished ; this was done by another assay. When the product was finished it was standardized. On adding the two portions previously removed to the finished product we obtained 15.25 gallons against 14.94 gallons obtained by the first assay, a difference of 0.31 gallon.

Several conclusions can be deduced from the above :

(1) Titration with volumetric acid solutions gives most encouraging results.

(2) That the "Fancy Root" is frequently not as valuable as the "Wiry Root."

305 CHERRY STREET,

PHILADELPHIA, PA.

CORRESPONDENCE.

TO THE EDITOR OF AMERICAN JOURNAL OF PHARMACY.

SIR:—The writer has been ever impressed with the work and good intentions of the membership of the "Alma Mater," they always being for the best interests of pharmacy.

Yet, when at a recent meeting of the Philadelphia College of Pharmacy, the action taken by the American Pharmaceutical Association at the Asheville meeting, as far as it related to Tax-free Alcohol, was denounced as being prejudicial to American pharmacy, and requesting the trade of this country to join with them in an appeal to the Government, for granting free alcohol under the present tariff bill, without pointing out to members of the profession the real and lurking dangers connected with this concession of Tax-free Alcohol, is a great surprise to the writer.

Being one of those who advised the course taken by the American Pharmaceutical Association, and on reading the "circular letter" on Tax-free Alcohol issued by the committee of the College, I am impressed with the fact that there is a noptimistic and pessimistic view in the controversy.

The writer wishes to say that he is opposed to *any* tax being levied on anything produced or manufactured *in this country*, and as it is necessary to raise revenue for the carrying on and maintainance of the Government, that the same be either raised by direct taxation of every individual, or by imposing sufficient tariff upon goods that are imported into this country. Therefore I am for *free alcohol for all*. I am, however, opposed to class legislation, and for this reason I do not favor free alcohol in the arts or medicine. Class legislation is one of the great curses of the land, and it is productive of law-breakers, and consequently crime and criminals go rampant. I will not go further into the moral side of the question, but will adhere to the economic issue.

Is it good business policy for the retail druggists of this country to ask for Tax-free Alcohol? In case the Government accedes to the request and allows the withdrawal and use of alcohol in the manufacture of medicine, the law provides that it be done under regulation and supervision of the Secretary of the Treasury and the Collector of Internal Revenue. Who will defray the expense of this supervision? Certainly not the Government, who, in granting a franchise, will not draw upon its treasury for the expense of its distribution. While the manufacturing pharmacist, who uses barrels of alcohol to that of the dispensing pharmacist's gallons, will cheerfully and willingly bear this expense, it will be out of the question for the retailer to do the same on account of a personal government supervision, which undoubtedly will be required.

Cannot we learn a lesson from the past? We petitioned Congress for the removal of the "stamp tax" from proprietary medicines; being promised by the manufacturers, that the retailer would receive the benefit in the less cost of goods. It was done, the tax was removed, and when we asked for the promised rebate, we were told that the money was being expended for advertising, and the retailer would thus be benefited. Then we took up the subject of having laws passed in the several states for the regulation of the practice of pharmacy. The laws have been in existence for a number of years, and I ask in all candor, who has been the beneficiary?

Therefore, my advice is to the retailer, ask for no tax-free alcohol; if the Government grants it under favorable regulations to us, all right; if otherwise, we will protest in having legislation that is injurious to our trade and profession, and not be placed in the position of being told you petitioned for it and you got it, as in the fable of the frogs.

ALBERT E. EBERT.

CHICAGO, December 16, 1894.

To the Editor of AMERICAN JOURNAL OF PHARMACY.

SIR:—With pleasure I noticed that the question about the presence of an *active principle in Cereus grandiflorus*, has been taken up in England. I would like to call your attention to an article in the *Pharm. J. and Transactions* for Nov. 24, 1894, p. 416, by Gordon Sharp.

"A preliminary analysis of *Cactus grandiflorus*," in which the author decides "glucosides and alkaloids are absent" in the plant.

This disposition of a mooted question is effective. Over three years ago I was engaged in a similar investigation. I beg leave to refer you to a *Note on Cactus*, written in August, 1891.¹ A certain Dr. O. D. Deyer stated that he had isolated the active principle of *Cereus grandiflorus*, and employed it in constant and definite quantities, (*New York Medical Journal*, for June 13, 1891). It is not uncommon that substances are found by amateur chemists which do not exist; that could not have been found if their method of investigation was correct, or substances that are of an entirely different nature from the supposed and claimed one. Impurity of reagents, ignorance of the operators, lack of a good scientific foundation, often come together in those discoveries.

To general methods of plant analysis, fluid extract of *Cereus grandiflorus* did not yield to me an alkaloid. These methods included "characteristics for many glucosides," I worked in 1891 on plants obtained here.

Yours truly,

J. B. NAGELVOORT.

DETROIT, December 10, 1894.

THE KOLA NUT.

The following information concerning this drug has just appeared in Consular Report, Vol. 46, No. 171, page 532.

The Department on August 18, 1894, instructed the consuls at Bathurst, Gorée-Dakar, Monrovia, Mozambique, Sierra Leone, Tamatave, and Zanzibar to investigate and report upon the kola nut in their respective districts—its cultivation, the trade therein, and its ascertained value as a substitute for ordinary food.

The following reports from the consuls at Sierra Leone, Tamatave, and Zanzibar, are in reply to the foregoing instructions. No replies have been received from the consuls at the other places; when received, they will be published at once.

¹ *Bulletin of Pharmacy*, 1891, p. 354.

SIERRA LEONE.

Referring to instructions from the Department, under date of August 18 last, I have the honor to state that, with the view of obtaining the best and most reliable information on the subject-matter, I immediately addressed the administrator of this colony, and have the honor to inclose his reply, received to-day, which contains all the information at present available, from public sources, on the subject of the growth, output, export, and value of kola nuts, as regards the colony of Sierra Leone.

GOVERNOR CARDEN TO CONSUL POOLEY.

GOVERNMENT HOUSE, FREETOWN, SIERRA LEONE.

October 16, 1894.

SIR: In reply to your letter of the 17th ultimo, asking for certain information respecting kola nuts, I have the honor to forward herewith copies of memoranda by Mr. Spaine, the colonial postmaster, and Mr. Faulkner, the assistant colonial secretary, on the production, output, export, and prices of this article, which, I trust, will meet your requirements.

The "broad leaf," mentioned in the assistant colonial secretary's memorandum, I understand, belongs to the natural order of the malvaceæ and is known in the West Indies and South America by the name of "Bal leaf."

I have, etc.,

F. CARDEN,

Administrator.

ASSISTANT SECRETARY FAULKNER TO GOVERNOR CARDEN.

Herewith is a memorandum, made by Mr. Spaine, the colonial postmaster, respecting the production of kola nuts. The kola tree produces the nuts in pods containing from three to eight nuts. When full, the pod changes from a green to a red-brownish color, and, if not picked in time, dehisces or falls to the ground.

The nuts, when collected, are laid by for a few days to allow the skin to soften, so as to admit an easy removal when washed.

The nuts are exported in two ways, viz.: fresh and dry. To keep it fresh, care should be taken that the nuts are properly washed with clean, fresh water, not a particle of the decayed skin being allowed to remain on them. After the water has drained, the quantity for shipment is put into a cane basket, inlaid with a kind of broad leaf peculiarly adapted to keep the nuts fresh for a considerable time—say, three months and more—and to keep away worms, which are very destructive to the nuts.

To export it in the dry state entails no trouble. After getting off the skin, by washing, the nuts are split into pieces and dried in the sun, after which they are shipped in ordinary packages, and, so long as kept dry, are not subject to deterioration. The fresh nuts are sold in Freetown at from £3 to £6 (\$14.60 to \$29.20) per measure, equal to 1½ bushels.

The kola nuts are principally exported to the following places, and those exported from Sierra Leone in 1893 were as follows:

Whither Exported.	Quantity.			Value.	
	<i>Cwts.</i> ¹	<i>Qrs.</i>	<i>Lbs.</i>		
Gambia	5,552	2	7	£24,130	\$117,416.58
Dakar	1,518	0	14	5,921	28,811.59
Gorée	694	1	2	3,055	14,865.63
Senegal	928	0	18	4,471	21,755.89
Windward Coast	291	1	0	1,164	5,664.02
Rufisque	221	2	24	896	4,359.94
Other places	147	2	0	468	2,277.28
Total	9,353	2	9	£40,105	\$195,150.93

¹ 1 cwt. = 112 pounds.

POSTMASTER SPAINE TO ASSISTANT SECRETARY FAULKNER.

The kola nut is grown from the nut itself. It should be planted when the nut is fresh, and not in the dried condition in which it is exported to European markets.

Raw kola nuts should be planted in nursery beds, the same as coffee seeds. They will begin to shoot in about five weeks and produce leaves in a week after. It grows with some rapidity in its early stage, and in less than four months, if regularly watered, the plant will be fit for transportation. Its growth after this is slower, according to the nature of the soil. The kola likes a moist, but not damp, soil and thrives best by the side of running brooks. Lands with a flat-rock formation a few feet below the soil will not do, but a loose, porous soil, with a great depth of earth and a clay or sand formation below, will do very well. With a liberal supply of manure and water, during the dry season, the kola tree will come to maturity and bring forth fruit in five years. Where the conditions are less favorable, the tree, will bear fruit two or three years later.

I may add to the foregoing, from personal knowledge, that the natives here, and at Bathurst, Gambia, eat the nuts in the early morning, as a stay against the wants of ordinary food while traveling, and in the evening to induce sleep. Altogether they consider that a general benefit to the human system is derived from the consumption of the kola—say a single nut morning and evening.

ROBERT P. POOLEY,
Consul.

SIERRA LEONE, *October 16, 1894.*

THE APOCYNACEÆ IN MATERIA MEDICA.

BY GEORGE M. BERINGER.

(Continued from Vol. 66, page 550).

STROPHANTHUS KOMBÉ.

Strophanthus Kombé Oliv., confounded from the first with *S. hispidus*. The species was created by Oliver from the specimens sent by Dr. Kirk from Zanzibar and those collected by the expedition of Livingstone. The differences which separate this species from *S. hispidus* are, on the whole, small and gradually effaced by the existence of a series of stages in the transit, in such a way that we may admit with Blondel, and with Oliver likewise, that the *Kombé* is only an oriental form of the *hispidus*, possibly a variety. The form *Kombé* commences to appear in the region of the great lakes, then extends as far as the eastern coast. Among other botanical characters are the form and the less length of the calyx lobes in comparison with the tube of the corolla, the consistence of the calyx and bracts, the scarcity of inflorescence, the pubescence more abundant on the leaves, the size of the fruit, the caducity of the bracts, the considerably much larger seed, the abundance and length of hairs on its surface, the increased length of the awn and of the shaft, the color of the seed more or less green, the great length of the funiculus, the elongated form and the number of the lenticels on the fruit, etc., etc. All these characters which seem clear at first sight, become indefinite when we examine a sufficient number of specimens, permitting the verification of the intermediary stages.

The *S. Kombé* inhabits the basin of the Zambesi and the Shire where it serves as the arrow poison. Indicated as about the Victoria Falls, an equal distance from the two oceans, it extends to near the eastern coast (Mozambique), and to the north in the region of the great lakes of the centre.

The plant is analogous with the *S. hispidus*. It flowers in October and November. The various parts, wood, bark, etc., are strongly bitter. The rough pubescence is very marked upon the leaves, the inflorescences and even the flowers. A specimen of the fruit sent by Dr. Kirk measured 32 centimetres in length. The upper extremity tapering at great length, but broken. It is said to be terminated by a stigmatic disk, greatly developed. External surface strongly wrinkled longitudinally, color a dark brown, len-

ticels extremely numerous, transversely elongated and irregular, forming a striation, close, and light brown. The commercial fruit is more or less scraped; bearing at times the remains of the fibres of the mesocarp, appearing as longitudinal striations. More frequently the endocarp alone remains, straight or curved, always fragile and frequently broken, the color yellowish or clear fawn, or a little reddish, often marked by regions more deeply brown, longitudinal and badly limited. The lower extremity is notched, the upper extremity always broken. The internal face is shining, color a little green. It is about 25-35 centimetres in length and 2 centimetres in diameter.

The structure of the pericarp is a little different from that of *S. hispidus* and that of *S. niger*; the parenchyma cells here are sinuous, flattened, or in some regions more open. The sclerotic fibres are nearly constantly associated with a ligneous bundle. The longitudinal fibres are flattened quite regularly.

The *seeds* are striking at once by their color, generally light, their surface strongly tomentose, their silky changeable lustre. The seeds isolated, as they ordinarily arrive in commerce, are in form lanceolate, at times rounded at the base, at other times much more slender even in the same specimen. The dimensions are 11-22 millimetres in length, $2\frac{1}{2}$ -5 millimetres in breadth, and 1-2 millimetres thick. The margin is often sinuate, one face quite plane or even concave. The surface is covered with hairs much longer, much closer, more woolly than in the *S. hispidus*, and quite visible to the naked eye. They vary in color from cream white to nearly a brown, with all the intermediary colors and sometimes even with a little different tint upon the two faces of the seed. But the color ordinarily is a greenish gray or a greenish yellow. From handling the hairs drop off and the color then becomes a little more deep. The raphe is ordinarily well marked, very prominent on one side, and quite long. The fracture is white or grayish; the odor is specially well marked, but only if we scrape the seed; the taste is atrociously bitter.

The awn which surmounts the seed is very handsome; the color a little grayish in mass, and is borne upon a very long shaft of which the naked part is always much longer than the plumed part, but not three or four times as long, as some one has said. The naked part generally 4-5 centimetres and the plume 3-4 centimetres. The hairs

are whitish, silky, brilliant, often $5\frac{1}{2}$ –6 centimetres or more long, always easily broken. They spread quite well without becoming entirely horizontal. The naked part of the shaft is more resistant than that of the *hispidus*. It is sinuous and of a pale yellow color. The albumen and the embryo are very similar to those of *hispidus*. The radicle is quite long and the cotyledons very thick. The hairs retain so much air that the seed floats a long time in water.

We may distinguish three varieties based upon the anatomical structure, and in these may exist yet others. The first variety is the largest and possesses a longitudinal projection on the ventral face, quite sharp, with the thin borders folded and the dorsal face quite convex, turned over at times like a tuft of moss.

The second variety is more attenuated towards the base, the point, ordinarily asymmetrical, shows an abrupt depression upon the dorsal face; the hairs are longer and changeable.

The third variety is less lanceolate, more sharply attenuated at both extremities; the ventral face much less flat; the tufted part a slender filament that becomes spread about the middle of the ventral face. It seems that the anatomy differentiates these forms not yet referable to definite species. In the external layer the thickenings are quite varied in the forms. The second tegumentary layer with the flattened cells more or less dilated between the depressions of the tegmen; in the albumen, the cell walls vary in thickness and aspect. In none of these are crystals of calcium oxalate. The action of sulphuric acid is the more remarkable upon this seed so rich in *Strophanthine*: scarcely is the section placed in the reaction than an intense green coloration is revealed in the entire thickness of the albumen; then rapidly likewise, but less, about the tip and its immediate neighborhood; the coloration shows in the embryo, occasionally, with a bluish tint; the color is always less bright than in the albumen. Shortly the aspect changes: the albumen becomes greenish yellow, while the embryo passes to an intense blue. Finally, it gradually assumes a reddish or even greenish tint with here and there a few red streaks.

STROPHANTHUS PAROISSEI.

S. Paroissei Franch. an African species, inhabiting French Guinea to south of the Senegal. The plant is but little known, bears the indigenous name of Bini-bande, and presents branches

covered with lenticels and relatively small leaves. The follicle seems quite characteristic, very shrunk and obtuse, rounded about the summit, 18–20 centimetres in length. The naked part of the awn or shaft is nearly $3\frac{1}{2}$ centimetres, Franchet says 4–5 centimetres. The plumed part always quite small, 18–20 millimetres. The hairs of the awn are quite long, nearly 3 centimetres, white, slightly yellowish, fine, brilliant and silky.

The seed is lanceolate, the form occasionally somewhat asymmetric, 10–15 millimetres in length, $3\frac{1}{2}$ millimetres in breadth, and $1\frac{1}{2}$ millimetres in thickness. The posterior extremity is rounded, the anterior lengthily attenuated into a very fragile shaft. The surface chocolate brown, covered with short, crowded brown hairs easily seen with a lens or even with the naked eye. The ventral line is rarely very clear.

This species is important because it inhabits the same regions as the *S. hispidus* and *S. minor* and the seeds closely resemble those, so that the substitution or admixture becomes very certain. The bitterness of this seed is relatively weak.

The first layer of the seminal tegument shows cells with the lateral thickenings quite small, convex, but not at all hemispherical. The second tegument is composed of cells extremely crowded and compressed, is a deep brown and is very little thickened. On a level with the raphe the second tegument divides into two, the external zone being very dark, the internal much more clear; between these is placed the fascicles.

With sulphuric acid the section is colored at once a yellow with a little greenish (but it is the droplets of oil which becomes colored), then to a rose (tissue of the cotyledons). But the color is never a decided green. This character, in conjunction with the abundance of the macles of calcium oxalate in the embryo and with the taste but slightly bitter, seems to indicate that the seed is quite poor in active principle.

THE WOOLLY STROPHANTHUS OF ZAMBESI.

Strophanthus asper Oliv.—Although the botanical information is reduced to a minimum, it is evident from a single inspection of the seed that one is dealing with a distinct species. But, after more than six years, the primitive name given by Blondel, "*Strophanthus lanieux du Zambèze*," remains a *résumé* of our geographic and botanic knowledge upon this subject.

The awn is greatly developed toward the summit, garnished with hair, relatively short, directed obliquely from base to the summit and a little yellowish. The naked region of the shaft is very short.

Regarding the seed itself, it is at once remarkable for its yellowish-white color, shining, owing to the tomentum, extremely thick and long, with a soft woolly fleece. These hairs are directed from the base toward the summit; detached they form in the drug frequently handled small woolly balls. Their length exceeds 3 or $3\frac{1}{2}$ mm. especially upon the margin of the seed.

Under these hairs the color of the seminal tegument is a bright maroon. The form is vaguely lanceolate, rather oblong, sometimes a little irregular, the larger proportionally quite variable; rounded in the rear and a little tapering in front. The anterior portion covered by the hairs frequently difficult to be seen. The ventral face, a little flattened, presenting a small brownish tuft, a little inflated at its termination, towards the middle of the seed. The surface is longitudinally striated. The dimensions are 10 to 20 mm. in length (ordinarily 14 to 16), 3 to 4 mm. in breadth and $1\frac{1}{2}$ to 2 mm. in thickness.

Macerated in water the seeds alter rapidly, soon exhaling a very disagreeable odor. The albumen is grayish-white, less horny, less cartilaginous than in the other species. The embryo is dull white with thick cotyledons and a radicle infinitely shorter than in the *S. hispidus* or the *S. Kombé*.

The transverse section shows that in the external layer the lateral cell thickenings are very little convex, and gives to the section the aspect of a lenticular fusiform body by coalescence with the corresponding thickening of the neighboring cell. The second layer of the tegument is formed of cells much flattened and nearly indistinct. The cells of the albumen and the thick embryo are relatively small.

With concentrated sulphuric acid, the cotyledons give gradually a bright rose coloration, commencing about the vascular bundles. The color is much less intense in the albumen. In a few sections the red color is preceded by a yellow coloration. After one hour the albumen becomes red and the embryo violet.

THE GLABROUS STROPHANTHUS OF GABOON.

Strophanthus Sp.? Important as have been the numerous expeditions of M. Vincent, Dr. Bellay, etc., and the physiological studies

by Polaillon and Carville and the chemical investigations by Gallois and Hardy, Catillon, Arnaud, etc., these seeds can not yet be referred with certainty to any species botanically determined. According to M. Franchet, it is a fact, however, remarkably interesting: that in all the *Strophanthus* with glabrous seeds (all the Asiatic species are in this class), there exists a constant relation between the absence of all villosity and the length of the point that terminates the anther. Now among the numerous African *Strophanthus*, two only present this character of the anthers, the *S. gratus* Franch. and *S. Tholloni* Franch. which inhabit precisely the region of the origin of *S. glaber*. According to Thollon this second species bears at Gaboon the name of *Onaïe*. It is thus allowable, with Franchet, to attribute this seed to one or the other of these plants, provisionally and the rather to *S. gratus* which is likewise from the Gaboon, while the *S. Tholloni* is from the regions of the rapids of the Ogoway consequently more to the East.

The *S. gratus* Franch. (*Roupellia grata* Wall et Hook., *Nerium guineense* Brongn., etc.) is a small tree, according to Griffon du Bellay, but more probably a liane. The plant inhabits Guinea, the Gaboon and Sierra Leone, whence it was introduced into culture by Whitfield under the name *S. Stanleyanus*.

The *S. Tholloni* Franch. is probably the species of which the fruits were sent by Thollon containing seeds very analogous to those of the *S. glaber*. It is a long liane of western Africa inhabiting the French region of the Congo, especially the course of the upper Ogoway and the Cameroon, and its extent may be quite far towards the centre of the continent. The lobes of the corolla are short and sharp in the *S. Tholloni* and nearly round in *S. gratus*.

The *S. glaber* serves for the fabrication of the arrow poison in this district.¹ For a long time the seeds were confounded with those of *S. hispidus*, from which they may be easily distinguished.

¹ The bark and leaves are poisonous, but less so than the seeds. To obtain one kilogramme of the seed 150 pods must be collected.

It is this seed which is employed for the *kombé poison*. The seeds deprived of their awn, are beaten between two stones, and the paste worked up with a knife into a creamy consistence by the addition of a little water or certain vegetable juices, and becomes a red color from exposure to air. This paste is applied to the points of the arrows or they are rolled in the substance, to which is previously added some adhesive ingredient (the mucilaginous bark of a *Tiliaceæ*, the latex of a *Euphorbium* rich in caoutchouc, the juice of the

Each follicle is 30 to 35 cm. in length, strongly ligneous and very thick. The exterior surface is brown or reddish, with oval lenticels. In its commercial form, it is bound with the leaf of a palm. The endocarp is fusiform, swollen about the middle 3 to 4 cm. in diameter. The color externally is yellowish to brownish yellow. The surface is quite smooth, dull, non-striated. The interior surface is fawn colored, uniform, shiny, with a brilliant silkiness.

The seeds are much shorter than the other species studied. The shape of the isolated seed is lanceolate with the base ordinarily rounded or truncated and the summit lengthily attenuated with the margins more or less sharp, especially at the base, oftentimes somewhat undulated, always somewhat flattened, never cylindrical, the seeds relatively large averaging 13 to 16 mm. in length by 3 to 4½ mm. in breadth and 1 to 1½ mm. in thickness. The dorsal face clearly convex, the ventral flat or even concave. A small keel exists at times near the shaft upon the dorsal face. The surface of this grain is absolutely glabrous and presents only the longitudinal plaitings. The color is an ochre-yellow, fawn, or cinnamon, but often deeper or greyish. The appearance is waxy, dull, tarnished; the fracture is horny, whitish or gray; the odor is especially well marked; the taste extremely bitter. It requires about 35 seeds to weigh 1 gm. The naked part of the shaft is very short (about 1 cm.) in comparison with the plume, which often attains 4 cm. The hairs of the same are sometimes nearly 7 cm. in length; they are numerous, silky, brilliant, fine, fragile, white, viewed in mass yellowish or grayish and diverging, describing a graceful curve.

The envelope is relatively very thin; the albumen thick, cartilaginous, transparent; the embryo is not thick, the radicle is long as in the *hispidus* and *Kombé*.

On transverse section the seed shows first the external layer of the tegument with the thickened cells large and short, a little larger

petiole and leaves of two indigenous plants not determined, etc.). The substance dried, the arrow is ready. The effects are very rapid, and the game wounded falls within the limit of one hundred metres. The hunter hastens then, to excise with a knife, all around the wound, or better, forces in the wound the juice from a branch of *Adansonia digitata*. These precautions taken, the game may be eaten with impunity. The act of poisoning their neighbor flourishes among the Gabonese with all its splendor, and the *Inee* takes the first rank among those numerous powders, the recipes of which these savages religiously transmit as an inheritance.

toward the internal region. The second seminal zone is strongly compressed especially on the inside and the first layer of the albumen is strongly thickened on the outside. The cells of the embryo are often not distinct in outline; they are rich in oil.

With concentrated sulphuric acid the coloration is effected slowly and is never green. At first yellow, then becomes a bright rose. The rose appearing in the neighborhood of the vascular fascicles, and remaining more deeply so there. Finally, very slowly, a violet color is produced.

STROPHANTHUS DIVARICATUS.

S. divaricatus Hook. et Arn., *Pergularia divaricata* Lour.; *S. divergens* Grah.; *S. dichotomus* β *Chinensis* Ker. This species occupies the sea coast of China. The carpels are strongly divergent and make with each other an obtuse angle. The follicle is relatively small, 13–14 cm. in length and nearly 4 cm. in diameter; the fruit is quite slender and the base strongly notched about the insertion of the peduncle. Externally it is blackish brown, strongly striated longitudinally, and here and there a little yellowish or reddish in places. The interior is smooth, greenish yellow and generally dull. The seed is 15–17 mm. in length by 3–3½ mm. in diameter and 1–1½ in thickness, with margins a little undulate. Color a blackish grey to deep brown. The ventral face bears a longitudinal line, brighter in color, and running nearly the entire length. The naked part of the shaft or awn is very short, 4–6 mm., the plume is much longer, 2–3 cm., and brighter in color.

The hairs of the awn are white, in mass grayish, quite long, 3½ to 4 cm., and relatively less fragile and more rigid than in the other strophanthus. They are directed forward here horizontally, then little by little they return to the rear, passing even beyond the body of the seed. The attitude is inverse to those of the *S. Kombé*. The taste is much less bitter than that of *S. glaber*. With concentrated sulphuric acid the albumen and the embryo give a red, orange coloration.

Strophanthus Caudatus, Kurz., *S. dichotomus*. A.—P. DC. This species occurs in Java, India, Tonquin, Singapore, the Malay peninsula, and is cultivated at Reunion.

The variety, *Marckii*, inhabits India and Malacca, and, according

to Franchet, the seed greatly resembles that of *S. glaber* of Gaboon. It is feebly bitter.

FALSIFICATIONS.—The substitution of one sort for another is frequent, as well as the admixture of the various products of different species. The admixture of seeds, which had been previously extracted with alcohol, is likewise a fraud, to which attention is directed. The frightfully bitter taste of *strophanthus* is somewhat reduced by this treatment, and an excellent character for its detection is the appearance of the seed which becomes dull, and of a greenish-brown color, with the hairs agglutinated by the resin which is dissolved by the alcohol. The distinction between the seeds foreign to the genus, is quite easy, a glance of the eye ordinarily suffices. The single falsification of this nature which is really serious, is the substitution of a seed, at first attributed to a *Wrightia*, or to *Holarrhena antidysenterica*, but which E. M. Holmes has proven to be derived from *Kickxia africana*, Benth. This seed is a uniform chocolate-brown color, attenuated at both extremities, inflated spindle-like about the middle, and twisted in an S, and bears on one face a depressed line. The surface examined with a lens, appears longitudinally striated. Dimensions, 9 to 16 mm. long, 2 to 2.5 broad at the middle, and 1.5 to 1.8 thick. The fracture is clear and horny, brownish-white; the odor resembles that of the *strophanthus*, and the taste is extremely bitter.

The seeds are provided with awns¹, directed backward in the fruit. These awns are formed of a straight and rigid axis, in the neighborhood of 1 cm. long, cylindrical, and slender, the silky hairs which it bears, attain 5 cm. in length, and are very delicate, and brilliant; in color, white, slightly yellow.

A transverse-section shows the cotyledons broad and thin, sinuous, and folded upon themselves, very different from those of the *strophanthus*. The external layer is formed of irregular, large, brown cells, often badly limited, but without the characteristic circular thickenings. The cellular walls of the albumen are very thick, and the cells of the embryo contain numerous macles of calcium oxalate.

The section treated with sulphuric acid gives a yellow coloration

¹ According to E. M. Holmes, this seed is destitute of an awn, the tuft appearing like a plumose awn, being really the hairy funiculus or stalk, by which the seed is attached to the pod.—G. M. B.

in the embryo, which then changes to an orange and then a red wine lees color, which persists for a long time. The liquid likewise becoming strongly colored.

CHEMICAL CONSTITUENTS OF STROPHANTHUS.—In 1865, Pelikan and Vulpian made the first physiological study of strophanthus with a hydro-alcoholic extract of seeds brought from Africa by Griffon du Bellay. In 1869, Fraser published his first work giving the chemistry and therapeutics. He studied in reality, not the *S. hispidus*, but the *S. Kombé*, and applied the name *strophanthin* to a principle which he isolated imperfectly and which he supposed to be an alkaloid. Then Legros made a series of experiments with the poisoned arrows of the Pahouins. In 1872, came the experiments of Palaillon and Carville, who employed the *S. glaber* likewise under the name of *S. hispidus*. In 1877, Gallois and Hardy in their analyses obtained results different from those of Fraser, which now is fully explained, as instead of the *S. Kombé* employed by Fraser, they used *S. glaber*. They isolated two substances: the one *Inéine* extracted from the awns, a body with alkaloidal properties and peculiar physiological action, but of which the existence even was afterwards contested by Elborne and by Gerrard; the other, the *strophanthin* crystallizable, separated from the seeds alone, and which according to these authors was neither an alkaloid nor a glucoside. Catillon in numerous analyses of the products of various origin obtained different *strophanthins*, some amorphous, others variously crystallized. Fraser, Adrian and Bardet, Catillon etc., showed the glucosidal nature of the principle and admitted the co-existence in the strophanthus of another body, alkaloid according to some, glucoside likewise according to the others. Finally, the magnificent work of Arnaud proved the absence of *strophanthin*, properly named, in the *S. hispidus*, its presence in *S. Kombé*, the replacement of the *strophanthin* by *ouabain* in the *S. glaber*. He gives the composition of these bodies, and indicates the formulas, and shows finally the relation between these two important substances, of which the one (*strophanthin*) is a higher homologue of the other (*ouabain*).

The *strophanthin* from *S. Kombé* is a non-nitrogenized glucoside with all the characters of the glucosides and readily yields with dilute acids glucose and strongly toxic substance, *strophanthidin*, of which the effects are not otherwise the same as those of strophanthine.

It crystallizes readily and is neither a glucoside nor an alkaloid. Strophanthine exists in *S Kombé* in the proportion of 0.4 to 0.9 per cent., while ouabain is furnished by *S. Glaber* to the extent of 4.5 to 5 per cent.

Strophanthin is accompanied in the seed by another glucoside and by a large proportion of a deep green fixed oil (according to Catillon 32 per cent). Fraser has also separated an acid for which he proposed the name of *kombic acid*. In addition there is contained a resin, mucilage and an albumenoid substance.

PHYSIOLOGICAL AND THERAPEUTICAL ACTION.—It was not till about 1885, that physicians following Fraser's experiments commenced to employ strophanthus. For a long time the results were contradictory and confusing. The same cause of errors which were fallen into in the chemical studies, appear here, the mixing of seeds, improperly named or falsified, occasioned differences, and the results were not comparable. On the whole, strophanthus is a muscular poison, acting upon all the striated muscles but more especially upon the heart. The action upon the heart can be obtained with the exclusion of all other action and with neither accumulation nor gastro-intestinal troubles. It seems established that *strophanthin* is not diuretic, nevertheless *strophanthus* is distinctly so. In physiological dose strophanthus augments the force and the amplitude, diminishes and regulates the number of the pulsations. By a toxic dose the paralysis of the heart is accompanied by dyspnœa, nausea, vomiting, weakness and muscular resolution. It is certain that its direct action is rapid and that it is well tolerated.

In answer to the query which strophanthus should be employed? the author favors the adoption of the *Strophanthus Kombé* for pharmaceutical uses for the reasons that it is most frequent in commerce, is very active and quite easily recognized.

ANDERJOW SEEDS.

The seed properly known under this name is that of the *Holarrhena antidysenterica*. Conessi bark is a product from the same tree. Both of these drugs have been admixed with, or entirely substituted by, inert products obtained from *Wrightia tinctoria*, or other species of *Wrightia*. The products of *Alstonia scholaris* have likewise been confused with these drugs. These substitutions explain the failures that have been obtained in Europe with drugs so universally employed in India.

In the appendix to the Pharmacopœia of India, by Waring, Wight has established the distinctive characters of these three trees in which the size is the same, the barks latex bearing and scaling off in strips; the flowers are white, and the inflorescences identical, the follicles long and slender and united in twos, the seeds garnished by tufts of white hairs. In *Holarrhena* and in *Wrightia* the leaves are opposite, oval, rounded at the base and attenuated at the apex, while in the *Alstonia* the leaves are verticillate, attenuated at the base and rounded at the summit. In *Holarrhena* the tube of the corolla is two or three times longer than the calyx, twisted to the left in æstivation, with naked throat, without appendages, stamens included and inserted in the dilated part of the tube. In the *Wrightia tinctoria* the tube is relatively shorter, prefloration twisted to the right, the sagittate stamens exserted, forming a cone about the stigma, and a crown of filamentous glands lacinate, velvety. The disposition of the hairs borne by the seed is likewise quite characteristic; in the *Holarrhena* the tuft of delicate silky white hairs is borne at the upper extremity of the seed; in the *Wrightia* it is the lower extremity, and in *Alstonia* both extremities are ornamented.

HOLARRHENA ANTIDYSENTERICA, Rob. Br. (*Nerium antidysenterica*, L. (in part). *Echites antidysenterica*, Roxb. *Chonemorpha antidysenterica*, G. Don. *Holarrhena pubescens*, Wall. *H. Codaga*, G. Don. *H. malaccensis*, Wight). This is a shrub, or at most a small tree, of which certain forms are glabrous and others tomentose, abundant in the mountains and dry forest regions of India. It is known in the various regions under a multitude of vernacular names.¹

[To be Continued.]

¹ Karra, Kora, Keor, Kuar, Kari, Dhudi, Kogar, La-thou, Inderjaw, Dudhuki-Lakri, Kureya, Kaureya (Hind), Vepali, Veppanla, Veppalay, Kulappalaiivirai; Kodoga-pala, Pala-chettu, Giri-mallika, Kalingamus, Kodisa-pala-chettu, Kodisa-pala, Kola-mukki-chakka, Kutajamu, Pedda-ankudu-chettu. Palavarenu, Ankudu, Palla-coodija, Manoopala, Girimallika, Inderjo, Dowla-koora, Koora, Pomdhra-koora, Dood-kora, Conapola, Koorchi, Curayja, Inderjauschiren, Palla-patta, Kiam, Kachri, Dudkuri, Tiwajs, Lissau-el-asafeer, Caraja, Cutaja, Amkudu-vittum, Dadhi-Ruar, Ankria, Kachii.

EDITORIAL.

It has always been the aim of the management of THE AMERICAN JOURNAL OF PHARMACY to first publish original papers on subjects relating to pharmacy, and then as far as possible to furnish abstracts of foreign communications. Not less than forty-eight pages are issued monthly. During the past year, however, this has been found insufficient to include all the original contributions offered, and it is probable that sixty-four pages will be the usual size of the JOURNAL for 1895. By this means we hope, in addition to the original articles, to give an occasional review of the latest developments in the various departments of pharmacy. A review of industrial chemistry for the year 1894 has been promised by an authority on that subject.

ADVERTISED THEMSELVES INTO FAME AND FORTUNE.

It is to be regretted that such an eminently respectable body as the *National Wholesale Druggists' Association* should be on the road to domination by a few "patent medicine kings."

Coincident with the autumn meeting of this Association in New York, the *Times* of that city commented on these proprietary manufacturers as follows :

They were men, any one of whom could have convinced one of the worthlessness of gold mines as compared with printer's ink. Their names are more familiar to the people of the United States than the names of the members of the President's Cabinet. They were men who advertised themselves into fame and fortune.

Then followed a short biographical sketch of each, which some of the pharmaceutical journals, who profess to live for the benefit of the pharmacist, have published, with the view of still further advertising their "kings."

While this article in the *Times* was written with the intention of lauding these men, to one who knows the true inwardness of the patent medicine business, it must have exactly the opposite effect. Nothing was said about the value or worthlessness of their bastard remedies; these men simply "advertized themselves into fame and fortune."

To put it more truthfully, they simply preyed on the imagination and resources of the poor and ignorant and made themselves rich.

A few days ago the writer received at his residence, through the Post Office, what professed to be a newspaper, but really was a circular from one of these "nostrum kings." This circular should never have been forwarded by the Postal Department; it was filled with the portraits and testimonials of such a miserable class of unfortunate women, and with such a host of "prayerful" letters from a still more detestable class of so-called Doctors of Divinity, about their wives, as to make it utterly unfit to appear in any respectable household.

The *American Pharmaceutical Association* kept the whole patent medicine subject out of its meetings for many years, but now one may listen to druggists, doctors and professors eloquently denouncing the "cutter" and vividly picturing how some "new plan" or "league" will enable the pharmacist to once more establish himself in this miserable traffic.

There is but one way for the pharmacists of the country to combat this business, and that is to combine against it. The physician and pharmacist could unite on this platform, and now is a very opportune time to do it, while the physician is thinking about conducting a little pharmacy of his own in the shape of a chest of "tablet triturates" and "compressed tablets."

JOHN M. MAISCH.

The biography of Professor Maisch, published in this Journal one year ago, gave a complete list of his contributions to pharmaceutical literature so far as this country is concerned, but we were recently supplied with a list of his papers contributed to *Buckner's Repertorium*, and consequently in the German language. The following are the titles and references, as translated and compiled by Mr. Hans M. Wilder, who thinks it covers all the contributions in German:

- (1) American Eclectic Resinoids. Vol. vi, p. 481-487. 1857.
 - (2) Sale of Poisons in U. S. Vol. vii, p. 267-271. 1858.
 - (3) Fluid Extracts in U. S. Same vol. and year, p. 297-304.
 - (4) Manufacturing Pharmacy in U. S. Vol. viii, p. 433-437. 1859.
 - (5) Alumen Ustum. Vol. ix, p. 127-129. 1860.
 - (6) U. S. Ph. Same vol. and year, p. 145-149.
 - (7) Mineral Water Trade in U. S. Vol. x, p. 257-259. 1861.
 - (8) Flora of Philadelphia. Vol. x, p. 289-294 and 259-364. 1861.
 - (9) Standing of the Pharmacist in the U. S. Army. Vol. xi, p. 294-299. 1862.
 - (10) Snake Bite Remedies in U. S. Same vol. and year, p. 352-356.
- Mr. Wilder also informs us that the penalty imposed on Prof. Maisch for his connection with the revolution of 1849 was 4½ years at hard labor in the penitentiary. Little wonder he sought the friendly shores of this country to escape such a penalty.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

LES DROGUES SIMPLES D'ORIGINE VÉGÉTALE. Par MM. G. Planchon et E. Collin. Tome premier. Paris. Octave Doin. 1895. Pp. 805.

This is a magnificent work on the simple drugs of vegetable origin. Beginning with the cryptogamia, the first article is on the varech (*Fucus vesiculosus*, L.), then follow in systematic order the various members of this series, which occupy sixty pages. The phanerogamia are then considered as far as the *campanulaceæ*, which terminate Volume I. The second volume is promised for the end of 1895.

The whole subject is treated in a systematic manner; for instance, each drug is described under the following heads: *origin, description, structure, chemical composition and uses*. Under some of the more important drugs there are given, in addition to the above, *the history, commercial varieties and substitutions*. There are 626 illustrations distributed through the volume, which greatly enhance its value. These, in many articles embrace, the whole plant, the part used, the structure and in some cases the starch.

Rhubarb is especially well-described and illustrated, the figures of the various commercial varieties, as well as those of the anatomical structure, being particularly noteworthy.

This volume is one of which the authors have the best of reasons to feel proud, and we shall await the appearance of the second volume with some impatience.

YEAR-BOOK OF PHARMACY, 1894. London: J. and A. Churchill. This valuable publication is made up of about 250 pages of abstracts and of over 200 pages of the transactions of the British Pharmaceutical Conference, held at Oxford, in August, 1894. The papers read at that meeting were given in

abstract in the September number of this journal. These papers are of such a character as to bear reading in full. The one on "Animal Extracts," by C. E. Stuart, is of especial value to the pharmacist.

MEDEDEELINGEN UIT 'S LANDS PLANTENTUIN. Eerste Verslag van het Onderzoek naar de plantenstoffen van Nederlandsch-Indie door M. Greshoff.

Communications from the Government Botanical Gardens Buitenzorg. First report on the active principles of plants growing in Dutch East India. By M. Greshoff. Batavia, 1890. Part VII.

The subject matter is as follows:

- I. On carpine (an alkaloid; yield 0.25 per cent. of the dried young leaves).—This is not the peptogenic principle of Wurtz and Bouchut—it is chiefly found in the parenchyma of the leaves, but in very minute quantities in other parts of the plant. Physiologically it appears to act on the heart, but does not seem to be very poisonous—a toad requires about 10–15 mgm. Greshoff recommends for medicinal use the hydrochlorate, which contains 82 per cent. of the alkaloid.
- II. First contribution to the pharmacological chemistry of Leguminosae, growing in Dutch East India. *Derris*; *Pachyrhizus*; *Sophora*; *Erythrina*; *Cassia*; *Crotalaria*; *Millettia*; *Acacia*; *Albizzia*; *Pithecolobium*, species. (Derrid; Pachyrhizid; Sophorin; Erythrine, etc.)
- III. Apocynæ of Dutch East India, containing alkaloids. *Melodinus*; *Leuconotis*; *Rauwolfia*; *Hunteria*; *Pseudochrosia*; *Ochrosia*; *Kopsia*; *Vinca*; *Alstonia*; *Voacanga*; *Tabernamontana*; *Rhynchodia*; *Chone-morpha*.
- IV. *Cerbera Odollam*.
- V. *Laurotetanine* found in *Litsaea*; *Tetranthera*; *Haasia*; *Notaphæbe*; *Aperula Actinodaphne*; *Hernandia*; *Illigera*; *Gyrocarpus*; *Cassytha*
- VI. Plants of Dutch East India, containing Hydrocyanic acid:
 - (1) Containing amygdalin. *Gymnema*; *Pygeum*.
 - (2) Not containing amygdalin. *Lasia*; *Pangium*; *Hydnocarpus*. *Gymnema latifolia* contains laurocerasine; the first time this principle has been found in a plant not belonging to Amygdalæ (Gymnema is an Asclepiadaceæ) 100 gm. fresh (?) leaves yielded 0.354 gm. AgCN. Dried in an exsiccator the leaves yielded no oil of bitter almond, even after months, on distilling with water, but quite a quantity after addition of emulsin.

Pygeum parviflorum and *latifolium*. The fresh bark of *latifolium* yielded a distillate, containing suff. HCN to form 89 mgm. AgCN from 100 gm. The fresh leaves yielded 31 mgm. AgCN = 0.006 per cent. HCN.

100 gm. fresh bark of *parviflorum* yielded 98 mgm. AgCN = 0.02 per cent. HCN.

Lasia Laureiro (Aroideæ). On macerating freshly powdered spadix twenty-four hours with 1 p. c. sulphuric acid water, and distilling with the usual precautions, Greshoff obtained from 100 gm. about 0.047 gm. AgCN. But on distilling the finely powdered spadix without previous maceration and without adding acid, he obtained nearly double the quantity; probably still more is originally contained in the spadix, a part of the hydrocyanic acid being necessarily dissipated by the heat (30° C.) necessary to drying it, previous to the

powdering. Greshoff instances that exposure to a colder climate even occasions loss of acid, relating that whole (uncut) cherry-laurel leaves, collected in November, distilled in Holland, yielded 0.086 and 0.133 per cent. HCN, while leaves from the same tree, but cut, yielded only 0.068 and 0.097 per cent. HCN.

Pangium edule :—100 gm. fresh seed yielded 0.357 gm. AgCN = 0.07 per cent. HCN. 100 gm. dried bark—0.063 gm. AgCN = 0.012 per cent. HCN. 100 gm. of the fruit-pulp—0.270 gm. AgCN. The young leaves contained 0.34 per cent. HCN (fresh leaves—1.676 gm. AgCN from 100 gm.). A tree of *Pangium edule* is calculated by Greshoff to contain at least 350 gm. of HCN.

Hydnocarpus inebrians and *alpinus* yielded respectively 187 and 41 mgm. AgCN.

MEDEDEELINGEN, ETC., ETC. Beschrijving der giftige en bedwelmende planten bij de vischvangst in gebruik. Door M. Greshoff.

Description of the poisonous and narcotic plants employed in fishing. By M. Greshoff. Batavia. 1893.

Greshoff intended originally to describe only such plants as were in use in Dutch East India for the above purpose, but soon found that many plants indigenous to the Indies, while in use elsewhere, were not used in the Dutch islands, and therefore has given quite a monograph concerning such plants, whether used in the East or in other countries.

Pp. 169 contains the literature examined by Greshoff; 171-175 the list of plants in the order in which they are treated; 176-179 the families, and 180-201 an alphabetical list of genera and species.

In his descriptions he quotes from many sources, using generally the words of the authors.

The number of plants mentioned is 233.

An appendix contains historical notices about the genus *Verbascum*, in relation to their use in stupefying fish.

H. M. WILDER.

CONSULAR REPORT, vol. 46, No. 170.

The article in this number that will interest pharmacists is on "The Vanilla Bean in Mexico," by Consul Charles Schaefer, at Vera Cruz.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 18, 1894.

On motion of Professor Trimble, Joseph W. England was called to the chair, the reading of the minutes of the last meeting was dispensed with. The registrar announced that there had been received forty-one volumes of the *Reports of the Finance Committee of the Senate*, and two volumes of the *Ethnological Bureau Reports*, by J. W. Powell, Director.

Professor Remington introduced his sketch of Henry Troth, by stating that he had tried for a number of years to obtain some permanent memorial of the founder of the College, Henry Troth, and, through the kindness of his daughter, Mrs. Henrietta M. Townsend, who gave it, he was enabled to present it to the Board of Trustees at their last meeting on the 4th inst. It is said to be a most excellent likeness of him at the time the College was founded, when he was in his twenty-eighth year. The paper was listened to with much interest, and referred to the Publication committee.

A paper upon *Dilute Hydrobromic Acid*, by Mr. LaWall, was read by Professor Trimble. It elicited some discussion as to the best method of preparing it. Prof. Trimble stated he had made considerable quantities of it at different times and with uniformly good results, by using Squibb's process.

Mr. Beringer said he thought that the preferable method was by treating bromine water with hydrogen sulphide. Mr. Thompson asked the proper strength, and the reply was that it should be a ten per cent. solution.

Mr. England read a paper upon the *Florida Sponge Industry*, by Mr. Wm. B. Burk. Mr. Thompson asked whether all sponges were bleached, and Mr. Hancock wished to know whether sponges were cultivated at the present time in Florida. Mr. England said that Congress had been asked to place a duty on sponges, and Mr. Burk had informed him that there was in Florida a sponge plantation; and it was stated that the bleached sheep wool sponge was not as strong as the unbleached.

Mr. Kebler asked what was the limit of sand and insoluble matter; that he had seen samples with as much as 26 per cent. of refuse matter in it. Mr. Beringer stated that he had found as much as 50 per cent. of sand and inorganic matter that could be beaten out. Mr. Kebler thought that there should be a standard of maximum of foreign matters fixed, so that dealers could know what to depend on.

A paper entitled *Laboratory Notes*, by Mr. Kebler, was read.

The first on *Pure Delaware Honey*.

Professor Remington stated that the reason honey had been omitted from certain official preparations, was the great variableness even in honey that was really pure natural honey.

Mr. Thompson thought it is not to be found in commerce of a standard quality, but although genuine it may be of variable composition. Mr. Kebler asked whether bees would directly store honey. Professor Remington said he had known of its being tried successfully provided the glucose was flavored (not glucose alone); he had used orange flower water as a flavor, and they readily stored it; the bees, however, did not thrive, as they needed the pollen for bee-bread, and they also required exercise.

(II) *Pyrogallic Acid* was also a subject of discussion.

(III) *Oil of Wine*.

(IV) *Oil of Sassafras*.

Mr. Beringer thought the synthetical oils should not be used to replace those of natural origin, as they generally are wanting in some essential constituent, and more oil is needed to accomplish the same amount of flavoring.

(V) *Ipecac* was also discussed. These papers were all referred to the Publication Committee.

Mr. Thompson presented a note upon Philadelphia history, written some years since by Thompson Westcott, giving the names of those druggists who were contemporary with Henry Troth, and were influential in founding our College; among the names appear those of John F. Wetherill, George D. Wetherill, Chas. Wetherill, and Sam'l P. Wetherill, Wm. Lehman, Peter Lehman, Algeron S. Roberts, Alexander Fullerton, Jr., Daniel B. Smith, Peter Williamson, and many others whose names are still in the memory of the older residents of our city.

T. S. WIEGAND,
Registrar.

CLASSES

—OF THE—

PHILADELPHIA COLLEGE OF PHARMACY,

SEVENTY-FOURTH ANNUAL SESSION, 1894-1895.

JUNIORS.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
A'Becket, Thomas Hopkinson,	Philadelphia,	Pa.	J. J. Moore.
Aikins, James Phil,	State College,	Pa.	W. S. Glenn, M.D.
Albaugh, Herbert Spencer,	Covington,	O.	A. C. Schofield.
Alexander, Charles Ellis,	York,	Pa.	Geo. W. Fulmer.
Althouse, Harry B.,	Harrisburg,	Pa.	F. J. Althouse.
Altmiller, Charles Fred.,	Hazleton,	Pa.	McNair & Hoagland.
Anderson, Ralph,	Latrobe,	Pa.	Jesse W. Pechin.
Ashmead, Alfred Elliott,	Philadelphia,	Pa.	B. P. Ashmead.
Asnis, Eugene,	New York,	N. Y.	Dr. Model.
Aszmann, Louisa Henrietta,	Philadelphia,	Pa.	H. L. Smith.
Bach, John,	Philadelphia,	Pa.	Wm. J. Pechin.
Baer, Hermanus Ludwick,	Somerset,	Pa.	John N. Snyder.
Bahé, William Franklin,	Chicago,	Ill.	W. A. Brabrook.
Baker, Newton Claire,	Watson town,	Pa.	Wm. A. Bright.
Baldauf, Leon Kahn,	Henderson,	Ky.	Julius L. Baldauf.
Barr, David Ford,	Philadelphia,	Pa.	B. J. Stathem.
Barrett, Wesley Johnson,	Downingtown,	Pa.	Geo. E. Dennisson.
Barth, Charles,	Philadelphia,	Pa.	W. G. Nebig.
Bartho, Fremont Kessler,	Sacramento,	Pa.	A. S. Jordan & Co.
Bartlett, Hannah Frances,	Vineland,	N. J.	S. Hayhurst, M.D.
Bates, John Phillips,	Mansfield,	Pa.	J. L. Smith.
Bauer, Edward Julius,	Philadelphia,	Pa.	L. G. Bauer, M.D.
Beardsley, Carrie Frances,	Merchantville,	N. J.	Special Materia Medica.
Beavans, Wm. Eugene,	Enfield,	N. C.	P. Fitch, M.D.
Becht, Frederick,	Philadelphia,	Pa.	A. R. Lawson.
Beckett, Josiah Bee,	Woodbury,	N. J.	A. S. Marshall.
Beeler, Aaron Wilson,	Mt. Eaton,	O.	A. W. Blackburn.
Beh, Edward,	Philadelphia,	Pa.	Harry Swain.
Bell, R. A.,		Pa.	G. B. Winebrenner.
Bensing, George Irvin,	Schuylkill Haven,	Pa.	S. S. Commings.
Berg, David,	Philadelphia,	Pa.	Special Chemistry.
Berkenstock, Oscar,	Tannersville,	Pa.	C. G. A. Loder.
Bingman, Harry Clayton,	Jersey Shore,	Pa.	J. F. Gray.
Blair, Geo. Thomas,	Shippensburg,	Pa.	J. C. Altick & Co.
Boose, Wm. Engelhart,	York,	Pa.	G. W. Fulmer.
Booth, Harry Emanuel,	Camden,	N. J.	A. J. Frankelberger.
Boyce, John Christian,	Philadelphia,	Pa.	H. J. Batdorff.
Breithaupt, Alphonse Peter,	Philadelphia,	Pa.	C. A. Werckshagen.
Brown, Edward Pennelton,	Winchester,	Va.	
Brown, James Lawrence,	Philadelphia,	Pa.	McClure, Heritage & Co.
Brown, Roscoe James,	Oxford,	Pa.	W. S. J. Brown.
Breuckmann, Walter,	Philadelphia,	Pa.	Emil Jungmann.
Brugler, Elmer Geo.,	Bloomsburg,	Pa.	J. H. Mercer.
Brumbaugh, Albert Sylvester,	Mansfield,	O.	Silas Shull.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Buehler, David Alexander,	Gettysburg,	Pa.	L. M. Buehler.
Buss, Marcus,	S. Bethlehem,	Pa.	Milton M. Buss.
Butler, John Bailey,	Newark,	Del.	J. Lehr.
Cameron, Charles Sherwood,	Rising Sun,	Md.	L. R. Kirk, M.D.
Campbell, Emerson,	Martin's Ferry,	O.	G. R. Ralston.
Campbell, Frank Book,	Leetonia,	O.	F. W. Wiedemayer.
Carson, Samuel Thompson,	Philadelphia,	Pa.	Dr. Meredith.
Carstens, Louis Peter,	Davenport,	Ia.	Gust. Schlegel & Son.
Case, Luella,	Delaware,	O.	Francis M. Starr.
Catherman, Isaac Newton,	Selins Grove,	Pa.	Geo. C. Wagenseller.
Chadwick, Samuel Hilton,	Wilmington,	Del.	Z. James Belt.
Charlton, John Edmot,	Baltimore,	Md.	D. W. Fleming.
Clapp, Samuel Clarence,	Milton,	Pa.	C. E. Stout.
Clark, Edward,	Reading,	Pa.	F. X. Wolf.
Clark, Robert Hall,	Union City,	Ind.	I. R. Frey.
Cloud, Norman Henderson,	West Chester,	Pa.	Luther Gerhard.
Coberth, Louis Alexander,	Baltimore,	Md.	
Codori, Simon Jacob, Jr.,	Gettysburg,	Pa.	J. M. Hillan.
Coller, Wm. Warner,	Reading,	Pa.	W. F. Potteiger.
Collins, John Hall,	Philadelphia,	Pa.	Lapp Drug Co.
Comber, Daniel Joseph,	Philadelphia,	Pa.	
Compton, Richard Hal.,	Allen,	Tex.	L. G. McKinstry.
Conklin, Claud Elgin,	Hornellsville,	N. Y.	H. B. Spackman.
Conover, Arthur Bruce,	Dayton,	O.	C. H. Breidenbach.
Cooper, Morris,	Fredericksburg,	Pa.	Jos. H. Garman.
Cowdery, Martin Franklin,	Philadelphia,	Pa.	Dr. Hazzard.
Craig, James,	Glasgow,	Scotland.	F. H. Davis, M.D.
Craig, Ralph B.,	Allentown,	Pa.	Kennedy & Brake.
Crayton, Blair,	Anderson, C. H.	S. C.	Simpson & Son.
Criswell, Edward Ott,	Waynesboro,	Pa.	Mentzer & Claigston.
Crumbie, James Henry,	Philadelphia,	Pa.	Geo. J. Crumbie.
Daniels, Charles Rockford,	Columbia,	S. C.	H. C. Blair.
Davis, Jacob Baumgardner,	York,	Pa.	J. R. Smyser.
Davis, James Joseph,	Scranton,	Pa.	C. Lorenz.
Davis, John Ellsworth,	Salem,	N. J.	W. H. Dunn.
Deane, Charles Howard,	Wilmington,	Del.	J. M. Harvey.
Deardorff, Calvin Abraham,	McKnightstown,	Pa.	J. A. McCurdy.
Deemer, Geo. Morton Hays,	Greensburg,	Pa.	J. V. Stephenson.
Deweese, Wm. Holstein,	Kennedyville,	Md.	McClure Heritage & Co.
Dickinson, Chas. Seymour,	Erie,	Pa.	C. J. Wood.
Donahue, John Linton,	Bloomsburg,	Pa.	Moyer Bros.
Draper, Oscar Carman,	Wilmington,	Del.	W. C. Taylor.
Dreifoos, Benj. Franklin,	Reading,	Pa.	A. Schaich.
Dutt, William,	Akron,	O.	E. H. Buehl.
Dysart, James Lafayette,	Anna,	Tex.	Dr. S. Evans.
Eckels, Frank Huston,	Mechanicsburg,	Pa.	C. A. Eckels.
Ehman, Joseph Wm.,	Warrensburg,	Pa.	Milton Huber.
Elliott, Boyce,	Winnsboro,	S. C.	W. E. Aikens, M.D.
Elliott, James Troxell,	Gettysburg,	Pa.	J. M. Huber.
Engler, Howard Samuel,	Easton,	Pa.	O. H. Sterner, M.D.
Entwistle, Albert Henry,	Philadelphia,	Pa.	C. H. Roberts.
Eschbach, Clarence V.	Milton,	Pa.	J. S. Follmer.
Evans, Fannie Cheney,	Malvern,	Pa.	
Failing, Wm. Clark,	Palatine Bridge,	N. Y.	H. C. Blair.
Fellowes, Merrill Elwyn,	Farmington,	Me.	A. W. Pottle.
Fews, Colin Spangler,	Middletown,	Pa.	J. D. McFerrer.
Field, Benj. Franklin,	Denton,	Md.	E. P. Stephens.
Filer, Burrett Borngton,	Hammonton,	N. J.	J. Frank Meade.
Flenniken, John Byron,	Uniontown,	Pa.	Frank Huston.
Fluck, Frank Wilson,	Allentown,	Pa.	Peters & Smith.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Flynn, James Francis,	Galesburg,	Ill.	C. D. Latterner.
Foster, Wm. Newell,	Philadelphia,	Pa.	W. H. Saurer.
Franklin, Wm. Oliver,	Atlantic City,	N. J.	T. H. Franklin, M.D.
Frederici, John Koch,	Auburn,	Pa.	C. M. Fry.
Freeman, Josiah Kisterbock,	Philadelphia,	Pa.	R. P. Marshall.
Funches, Cardoza Marion,	Rowesville,	S. C.	
Funk, Clifford Altamont,	Lancaster,	Pa.	J. A. Miller.
Gabriel, Robert Rudolph,	Philadelphia,	Pa.	D. H. Ross.
Garrison, Joseph Miller, Jr.,	Elmer,	N. J.	Theo. Campbell.
Geiger, Walter Samuel,	Reading,	Pa.	J. C. Griesemer.
Genz, George Leonard,	Hazel Green,	Wis.	T. McNeill.
Gessford, Otice Eugene,	Lippincott,	Pa.	Funk & Groff.
Godfrey, Swain T.,	Seaville,	N. J.	G. J. Pechin.
Godshall, Samuel R.,	Souderton,	Pa.	Smith, Kline & French Co.
Goldsmith, Lee,	Philadelphia,	Pa.	H. Wise & Co.
Good, Robert Franklin,	Allentown,	Pa.	Dr. C. A. Seler.
Goodfellow, Charles Rumney,	Germantown,	Pa.	E. M. Wallington.
Gorman, Charles William,	Gouverneur,	N. Y.	S. Felt.
Gorrey, Thomas Francis,	Bloomsburg,	Pa.	W. S. Rishton.
Graham, Harry Edgar,	Chambersburg,	Pa.	J. S. Barnitz.
Grakelow, Ralph,	Philadelphia,	Pa.	I. P. Amick.
Greer, Mary Caroline,	Philadelphia,	Pa.	
Griffith, Oliver Brownback,	Uwchland,	Pa.	C. A. Smith.
Gross, Ernest Alpha,	Wyoming,	Pa.	Dr. Wm. Delker.
Gross, Paul Herbert,	York,	Pa.	R. W. Ziegler.
Hahn, Charles,	Minersville,	Pa.	C. E. Howard.
Haines, Samuel Woolston,	Camden,	N. J.	E. W. Collins.
Halbe, John Peter,	Philadelphia,	Pa.	F. F. Drueding, M.D.
Hance, George Headley,	Philadelphia,	Pa.	R. A. Hance.
Handel, John Conrad,	Philadelphia,	Pa.	D. J. Weidner.
Hannan, Frank William,	Johustown,	Pa.	Charles Griffith.
Harlow, Charles Mills,	Wyncote,	Pa.	F. W. Brown & Co.
Harman, George Alvin,	Machiasport,	Me.	C. Longfellow.
Harrell, Herbert Dean,	Wheeling,	W. Va.	G. H. Ebeling.
Harris, Clarence Mulford,	Bridgeton,	N. J.	C. S. Ogden.
Harris, Overton Crawford,	Slater,	Mo.	
Harry, Hamilton Maxwell,	Conshohocken,	Pa.	Jas. W. Harry.
Hauck, John Francis,	Philadelphia,	Pa.	E. F. Kessler.
Haus, Ralph Leonard,	Mifflinburg,	Pa.	J. C. Steans, M.D.
Hayes, Edward Albert,	Belvidere,	N. J.	A. S. Wickham.
Hebden, William,	Philadelphia,	Pa.	Caleb Scattergood.
Heckerman, Adam Bruce,	Bedford,	Pa.	M. P. Heckerman.
Heffner, Edgar Franklin,	Centralia,	Pa.	Charles Lashelle, M.D.
Heim, Christian,	Philadelphia,	Pa.	Henry Mueller, M.D.
Heinbach, Frank Walton,	St. Clair,	Pa.	J. L. D. Morison, M.D.
Helfrich, Edward Daniel,	Galion,	O.	H. G. Hackedorn.
Hendrickson, Wm. Randolph,	Swedesboro,	N. J.	H. E. Jones.
Henry, Albert E.,	Point Pleasant,	Pa.	P. N. Pinchback.
Henshaw, Harry Pawling,	Bridgeport,	Pa.	Baker & Grady.
Herbst, Frederick,		Germany.	August Hohl.
Herbuveaux, Jules,	Utica,	N. Y.	J. H. Sheehan & Co.
Herzog, Albert,	Washington,	Mo.	E. W. Gallenkamp.
Hess, Daniel Clyde,	Hazleton,	Pa.	A. R. Calhoun.
Hiffmeyer, William Joseph,	York,	Pa.	Wm. Smith & Co.
Hildebrand, Howard Ovid,	York,	Pa.	A. H. Lafean & Bro.
Hippler, Harry Richmond,	Germantown,	Pa.	Wm. C. Bichy.
Hodil, Frank Dilworth,	Sligo,	Pa.	J. R. Murray.
Hoffman, William Shalter,	Washingtonville,	Pa.	J. F. Leavitt, M.D.
Holliday, J. Thomas,	Millington,	Md.	Slaughter & Besore.
Holshue, Charles Raymond,	Shamokin,	Pa.	Dr. F. A. Clark.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Horst, Harry Lewis,	Lock Haven,	Pa.	H. Hilton & Co.
Howard, Horace Emory,	South Hadley,	Mass.	J. J. Ottinger
Hukill, Oscar K.,	Hot Springs,	Ark.	Andrew Blair.
Hundertmark, John Charles,	Cleveland,	O.	Acker Bros.
Hunt, Warren Ernest,	Philadelphia,	Pa.	Jas. C. Perry.
Ingling, Howard Edgar,	Riverton,	N. J.	M. Cowperthwait.
Ink, Charles Thomas,	Columbiana,	O.	C. E. Ink.
Irwin, Wm. Reed,	Atlantic City,	N. J.	Dr. A. D. Cuskaden.
Jacobs, John Taylor,	Wilmington,	Del.	J. P. Williams.
Jacoby, Charles Nicholas,	Fond du Lac,	Wis.	C. P. Loeper.
Jaeger, Charles Frederick,	North Adams,	Mass.	E. E. Bostick.
James, Robert Rosser,	Scranton,	Pa.	Clarence R. Shryer
Jefferis, David Strode,	Philadelphia,	Pa.	Funk & Groff.
Jennings, Isaac Astor,	Philadelphia,	Pa.	
Johns, Frank James,	Mt. Pleasant,	Pa.	W. P. Wingender.
Johnson, Albert Burdis,	Point Pleasant,	N. J.	J. H. Munson.
Johnson, Charlton Graham,	Columbus,	Ga.	Evans & Howard.
Johnson, Ferdinand,	Philadelphia,	Pa.	Special Cemistry.
Johnson, Olive Curtis,	Danville,	Pa.	S. Y. Thompson, M.D.
Jolley, John James,	Philadelphia,	Pa.	F. M. Apple.
Jones, Walter Eugene,	Utica,	N. Y.	E. E. Jones.
Kaufman, Samuel,	Goodno,	Russia,	W. H. Piles' Son.
Kelchner, Charles Eber,	Bloomsburg,	Pa.	G. P. Ringler.
Kessler, Laurence Anthony,	Logan,	O.	F. W. E. Stedem.
Killiam, Wm. Smith,	Wilmington,	Del.	N. B. Danforth.
Kirlin, C. Coleman Hagenbach,	Mahanoy Plane,	Pa.	P. P. Kirlin.
Kline, Frank,	Reading,	Pa.	F. Morse.
Koehler, George,	Philadelphia,	Pa.	E. F. Kaempfer.
Kottcamp, Edward Charles,	York,	Pa.	Alva F. Tod, M.D.
Kramer, George Henry,	Philadelphia,	Pa.	Robt. McNeil.
Krewson, Chester Merrill,	Philadelphia,	Pa.	G. S. R. Wright.
Kunkle, Timothy Osgar,	Newberry,	Pa.	W. E. Kunkle.
Kunz, Charles Cornelius,	Philadelphia,	Pa.	P. P. Klopp.
Kufer, Harry John,	Corinne,	Utah,	C. W. Newton.
Lachman, Elmer Richardson,	St. Clair,	Pa.	
Langham, John Williams,	Philadelphia,	Pa.	E. B. Kyle, M.D.
Langner, Paul Harry,	Reading,	Pa.	I. J. Brandt.
Laucks, Wm. Irwin,	Philadelphia,	Pa.	W. H. Poley.
Laughlin, Albert Russell,	Newville,	Pa.	C. A. Eckels.
Leap, Percy Duff,	New Martinsville,	W. Va.	Long & Co.
Leas, Charles Wing,	Mechanicsburg,	Pa.	Eckels Bros.
Leighton, Carl Bure,	Philadelphia,	Pa.	R. Shoemaker & Co.
Lenhart, Enos Samuel,	Philadelphia,	Pa.	G. L. Carnan.
Le Sage, George Louis,	Fulton,	N. Y.	Wm. Wilson.
Leslie, Harry Carter,	Susquehanna,	Pa.	H. E. Outwater.
Levan, Walter,	Gordon,	Pa.	J. E. Gregory.
Lewis, Daniel Wm.,	Vineland,	N. J.	Wm. H. Faunce.
Lewis, Frank Joseph,	Philadelphia,	Pa.	W. F. Thompson.
Lewis, Howard Hornberger,	Reading,	Pa.	G. L. Dengler.
Liebert, Charles Frederick,	Philadelphia,	Pa.	A. G. Keller.
Light, James Raymond,	Lebanon,	Pa.	Geo. W. Schools.
Lightcap, Wm. Edward,	Smyrna,	Del.	G. M. Beringer.
Lincoln, Geo. Washington,	Philadelphia,	Pa.	H. G. Shinn.
Lindsay, James,	Amsterdam,	N. Y.	J. A. Barkuff.
Lippincott, David Alfred, Jr.,	Burlington,	N. J.	H. B. Weaver.
Littlefield, Bradford Allen,	Watertown,	N. Y.	C. E. Van Anamee.
Livingood, Wm. Worman,	Reading,	Pa.	J. C. Sanderson & Co.
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Longmire, Chas. Henry,	Philadelphia,	Pa.	F. P. Riedenauer.
Longshaw, Thos. Elmer,	Philadelphia,	Pa.	J. B. Moore.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Luhr, Fred. A.,	St. Marys,	Pa.	A. Müllhaupt, M.D.
Macbride, Wm. Vaughan, Jr.,	Philadelphia,	Pa.	Wm. F. Seiler.
McClellan, Howard Leslie,	Philadelphia,	Pa.	
McCracken, James Henry,	Darby,	Pa.	Harlan Cloud.
McDonnell, Wm. Joseph,	Philadelphia,	Pa.	Chas. P. McDonnell.
McGehee, Hanford Bell,	Staunton,	Va.	Lawson C. Funk.
McHenry, Walter Greenleaf,	Philadelphia,	Pa.	Aquila Hoch.
McLaughlin, Charles Bishop,	Millville,	N. J.	Dr. A. H. Lippincott.
McLemon, Felix Aloysius,	Conshohocken,	Pa.	C. Moylan.
McMillan, Edwin Horbaugh,	Elk Lick,	Pa.	A. F. Speicher.
McMillan, Harry Custer,	Zanesville,	O.	J. R. Johnson.
Mac Nair, Hugh,	Jarretts,	Va.	Lawson C. Funk.
Mahoney, James Norris,	Bridgeport,	Pa.	E. A. Stahler.
Malin, George Lawrence,	Atlantic City,	N. J.	Willard Wright, M.D.
Mangold, Wm. Ball,	Zanesville,	O.	W. A. Musson.
Maples, Murff Ford,	Pueblo,	Col.	A. C. Daniels.
Marshall, Charles Gross,	West Fairview,	Pa.	R. C. Marshall, M.D.
Marwood, Albert Victor,	Camden,	N. J.	Dr. Wm. Shafer.
Matthews, Chas. Morgan,	Philadelphia,	Pa.	Dr. A. Dalton.
Matusow, Harry,	Minsk,	Russia,	C. H. Bohn.
Mayburn, Edward Daniel,	Allentown,	Pa.	R. M. Sommers.
Meginniss, Wm. H.,	Wilmington,	Del.	N. B. Danforth.
Meier, August Joseph,	Germany,		Geo. J. Crumbie.
Mellon, Harry Winfield,	Tremont,	Pa.	A. Wasley.
Metz, Abram L.,	Chambersburg,	Pa.	Dr. C. B. Lowe.
Metzler, Claude Dallas,	Harrisville,	Va.	Jas. A. Ferguson.
Miller, John Henry,	Ephrata,	Pa.	W. G. Ruff.
Montgomery, John Custice,	Chambersburg,	Pa.	S. E. Wagaman.
Moore, Chas. Robert,	Altoona,	Pa.	G. A. Weston.
Moore, Fred. Smith,	Wilmington,	Del.	Z. James Belt.
Morgan, Clayton Edward,	Philadelphia,	Pa.	Frank E. Morgan.
Morron, George Shattuck,	New Lisbon,	O.	J. S. Marquis.
Morse, Thomas C.,	Montgomery,	Ala.	H. Gray Eakin.
Mountaine, Wm. Lewis,	Bangor,	Me.	L. L. Alden & Co.
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Musser, Frank Milburn,	Lewistown,	Pa.	A. P. Martin.
Nailor, Elmer Byard,	Wilmington,	Del.	Willard E. Smith.
Nebel, Charles William,	Philadelphia,	Pa.	C. B. Hunterston.
Nesbitt, Arthur Ettinger,	Philadelphia,	Pa.	Jas. A. Jeffries.
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Notley, William T.,	Port Deposit,	Md.	W. O. Thompson, M.D.
O'Donnell, David Howard,	York,	Pa.	B. S. Gilbert & Co.
Page, Edward Lewars,	Lancaster,	Pa.	C. A. Heinitsh, Ph.M.
Parry, Edward,	Wales,	Great Britain,	Dr. Kinsinger,
Parry, Wm. Hough,	Newton,	Pa.	H. S. DeKalb.
Parvin, John Pearson,	Reading,	Pa.	W. F. Potteiger.
Pasold, Julius Martin,	Joliet,	Ill.	Adolph Poehner.
Pearce, Samuel Robert,	Manasquan,	N. J.	A. Blair.
Peck, Wm.,	Nottingham,	England,	A. R. Hesske.
Peiffer, Chas. Oscar,	Folsom,	Pa.	Dr. A. R. Norton.
Phillips, Robert Craig,	Burlington,	N. J.	W. A. Strode.
Pierce, Herman Judson,	Troy,	Pa.	R. F. Redington.
Pierce, John Gray,	Sanford,	Pa.	
Pierson, Wm. Harry, Jr.,	Wilmington,	Del.	J. S. Beetem.
Pipes, Wm. Henry,	Millington,	Md.	
Post, Edward Meigs,	South Seaville,	N. J.	A. S. Buchanan.
Praul, Walter Francis,	Philadelphia,	Pa.	J. H. Masholder.
Preston, Gilbert Kent,	Philadelphia,	Pa.	Wm. Procter, Jr., Co.
Prosser, Thomas Moyer,	Hellertown,	Pa.	M. S. Apple.
Pulsifer, Jas. Perlie,	Lakewood,	N. J.	C. A. Bye.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Punt, Arnold Anthony Joseph,	Philadelphia,	Pa.	W. H. Pile & Son.
Purté, John Aldred,	Ocean Grove,	N. J.	H. L. N. Purté, M.D.
Quatman, J. Henry,	Philadelphia,	Pa.	C. Aug. Werckshagen.
Ranck, Chas. Watkins,	Philadelphia,	Pa.	John W. Ranck.
Rantz, John,	Sadow,	Russia.	Emanuel Lupin.
Read, Joseph Corson,	Fernandina,	Fla.	J. Barclay Hall.
Reed, Arthur,	Pillow,	Pa.	Thos. Hetherington.
Reed, Geo. Oliver,	Bridgeville,	Del.	B. L. Brown.
Reese, John Bull,	Centralia,	Pa.	Geo. W. Davis.
Reeve, James Whitaker,	Bridgeton,	N. J.	Reeve & Fithian.
Reilley, Isabella Buist,	Philadelphia,	Pa.	
Remaly, George Joseph,	Easton,	Pa.	Weaver & Solliday.
Rommel, George Swartz,	Port Royal,	Pa.	F. Ross Harner.
Rewalt, Jay William,	Middletown,	Pa.	J. W. Rewalt.
Rich, Benj. Howard,	Bellefonte,	Pa.	W. C. Keplinger & Co.
Richardson, Neafie,	Rio Grande,	Pa.	J. P. Frey.
Ridpath, Robert Ferguson,	Jenkintown,	Pa.	J. W. Ridpath.
Rieben, Ernest,	Philadelphia,	Pa.	P. H. Gallaschick.
Ritter, Erwin Sterner,	Richlandtown,	Pa.	Smith, Kline & French Co.
Ritter, Wm. Joseph,	Philadelphia,	Pa.	Geo. Bille.
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Robbins, Edward Cruise,	Haleyville,	N. J.	F. G. Thorman.
Roberts, Edward Roscoe,	Gatesville,	N. C.	
Roberts, Wm. Henry,	Utica,	N. Y.	J. H. Sheehan & Co.
Robertson, Henry Edward,	Philadelphia,	Pa.	Shinn & Baer.
Robno, Pinkas,	Kieff,	Russia.	E. Lupin.
Rochell, Harry Birch,	Philadelphia,	Pa.	W. A. Rumsey.
Rooney, James Peter,	Pittston,	Pa.	Wm. Webber.
Ross, Annie Catharine,	Philadelphia,	Pa.	J. L. Supplee.
Ross, Frank Budd,	Vincentown,	N. J.	F. S. Hilliard.
Roth, Francis John,	Lund,	Sweden,	F. L. Brown.
Rothberg, Elizabeth,	Charzoff,	Russia,	D. D. A. Modell.
Rutherford, John Burton,	Philadelphia,	Pa.	Chas. A. Rutherford.
Ryland, Geo. Bertram,	Grantsville,	Md.	J. B. Copland.
Sallada, Hunter,	Ashland,	Pa.	L. C. Voshage.
Sanders, Joseph Oliver,	Mifflinburg,	Pa.	T. E. Hickman.
Sayforth, Julius,	Leavenworth,	Kan.	Las. F. Ross.
Schad, Harry John,	Tamaqua,	Pa.	J. J. Steltzer.
Schaffer, Charles Abraham,	Berlinsville,	Pa.	J. A. Wiegner.
Schembs, Peter Joseph,	Philadelphia,	Pa.	I. H. Bailey.
Schiebel, Jacob Wm., Jr.,	Scranton,	Pa.	W. B. Pier, M.D.
Schindel, David Philip,	Hagerstown,	Md.	Samuel F. Schindel.
Schmiegl, Joseph Alphonse,	Philadelphia,	Pa.	H. D. Stechter.
Schneider, Kingsley Clark Thompson,	Berea,	O.	Noble & Stone.
Schnurman, Henry Samuel,	Allentown,	Pa.	J. W. Shoemaker & Co.
Schroeder, Johann Heinrich,	Cincinnati,	O.	L. N. Bérubé.
Scott, Emma Love,	Richmond,	Va.	S. Hayhurst, M.D.
Scott, Thornton T. B.,	Philadelphia,	Pa.	J. R. Smyser.
Sebring, James Woods,	Bellefonte,	Pa.	F. Potts Green.
Sellers, Walter Spangler,	Chambersburg,	Pa.	Cressler & Keefer.
Semmel, Franklin Peter, Jr.	Lehighton,	Pa.	C. T. Horne, M.D.
Sharp, Warren Reed,	West Chester,	Pa.	A. B. Hammond.
Shaw, John Thomas,	Philadelphia,	Pa.	Joseph Crawford.
Sherwin, Robert Southers,	Scranton,	Pa.	C. Henwood & Co.
Shissler, Edwin Ira,	Philadelphia,	Pa.	W. H. Galbraith.
Simpler, Willard Eugene,	Philadelphia,	Pa.	W. J. Jenks.
Slobodkin, Rose,	Minsk, Russia,		Woman's Hospital.
Smiley, Geo. Washington,	Philadelphia,	Pa.	E. R. Smiley, M.D.
Smiley, Laura Margaret,	Philadelphia,	Pa.	E. R. Smiley, M.D.
Smith, Cyrus Edward,	Philadelphia,	Pa.	H. A. Smith.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Smith, Justin Towne,	Windsor,	Vt.	W. A. Rumsey.
Smith, Paul,	New Berlin,	Pa.	R. Shoemaker & Co.
Smith, Thos. Brown,	Swedesboro,	N. J.	E. H. Fahey.
Snyder, Benj. Crawford,	Philadelphia,	Pa.	
Snyder, Harry Lamar,	South Easton,	Pa.	A. Spengler.
Spath, Geo. Balthaser,	Dillsburg,	Pa.	H. W. Fishell, M.D.
Spence, Wm. Arthur,	N. Clarendon,	Pa.	A. W. Storey.
Spidel, Frank Myers,	Bedford,	Pa.	Dr. Macfarland.
Stadelman, Herman R.,	Ardmore,	Pa.	H. M. Davis.
Stahl, Joseph Bowers,	Philadelphia,	Pa.	Bullock & Crenshaw.
Stanton, John Emmet,	Swatara,	Pa.	H. F. Rhoads, M.D.
Steadman, Merrill Linn,	Mifflinburg,	Pa.	
Steiner, Stewart Banks,	South Easton,	Pa.	Allen Spengler.
Stephens, Halsey DeForest,	Seaville,	N. J.	J. M. Ridge, M.D.
Stern, Wilson Clinton Ammon,	S. Bethlehem,	Pa.	D. Bruce Richards.
Stevens, Thos. Ray,	Bethlehem,	Ind.	H. B. Morse.
Stillwagon, Oscar Hulet,	Ambler,	Pa.	Jos. S. Angney, Jr.
Stine, Howard F.,	Mt. Carmel,	Pa.	A. S. Jordan & Co.
Stommel, Henry Aloysius,	Doylestown,	Pa.	E. M. Boring.
Stradley, Harry Benninghove,	Wilmington,	Del.	B. R. Veasey, M.D.
Strayer, Otho O'Burn,	Philadelphia,	Pa.	R. C. Cadmus.
Stroud, Allan Ward,	Phoenixville,	Pa.	J. B. Van Dyke.
Stroup, Freeman Preston,	Rouseville,	Pa.	W. C. Tyler, M.D.
Stump, Adam Franklin Marshall,	Womelsdorf,	Pa.	G. W. Ammon.
Swainbank, Chas. Miller,	Wilkes-Barre,	Pa.	H. H. Swainbank.
Swinehart, Daniel Harrison,	Pottstown,	Pa.	L. I. Shuler.
Taggart, George Cole,	Emporium,	Pa.	L. Taggart.
Thomas, Frank Benjamin,	Johnstown,	Pa.	Curt. G. Campbell.
Thomas, Howard Elwood,	Philadelphia,	Pa.	H. F. Rhoads.
Thorley, Alferetta May,	Harrisburg,	Pa.	
Thornton, Michael Thomas,	Ashland,	Pa.	J. V. Antill, M.D.
Tiefenbach, Jacob Frederick,	Easton,	Pa.	H. W. Sheets, M.D.
Tinsman, Edward Walker,	Williamsport,	Pa.	J. Miles Yost.
Tobias, Herbert,	Canal Winchester, O.		
Toelke, Charles,	Philadelphia,	Pa.	Frank E. Morgan.
Towles, Therret Rankin,	Henderson,	Ky.	J. L. Baldauf.
Townsend, James Vaughan,	Atlantic City,	N. J.	H. B. Leeds.
Trein, Chas.,	Easton,	Pa.	Chas. Shivers.
Troxell, Frederick Bethelier,	Lock Haven,	Pa.	Fetters & Hertel.
Troxell, John Oscar Peter,	Allentown,	Pa.	A. L. Dix, M.D.
Truax, Robert Severson,	Dover,	Del.	Burton & Sypherd.
Twist, Oliver,	Trenton,	N. J.	Oscar Davison.
Tyson, Warren Sunderland,	Norristown,	Pa.	Atwood Yeakle.
Urich, Mark Spangler,	Myerstown,	Pa.	I. S. Schmehl.
Vernon, Harold Gilmour,	Clifton Heights,	Pa.	G. R. Vernon, M.D.
Wagner, Chas. Henry,	Ashland,	Pa.	A. Shoenberger.
Waldner, Paul Jacob,	Philadelphia,	Pa.	W. G. Toplis.
Wasley, Frederick Stanley,	Shenandoah,	Pa.	H. M. Wasley.
Watkins, Mack McInnis,	Mosspoint,	Miss.	O. Eastland.
Watson, Jonathan Ingham,	Lambertville,	N. J.	S. W. Cochran & Co.
Watson, Joseph Shaffer,	Mt. Holly,	N. J.	W. Simes & Sou.
Waugh, Wm. Alexander,	Clinton,	N. Y.	E. G. Bissell.
Webb, Horace Gilbert,	Norristown,	Pa.	Wm. H. Campbell.
Weida, Chas. Arthur,	Reading,	Pa.	J. B. Raser.
Weiss, Henry Beale,	Philadelphia,	Pa.	Bullock & Crenshaw.
Weiss, Wm. Erhard,	Canton,	O.	Fisher & Young.
Weitzell, Sue C.,	Greensburg,	Pa.	S. Hayhurst, M.D.
Wells, James Ralston,	Philadelphia,	Pa.	Bullock & Crenshaw.
Wentzler, Hartman Gotthard,	Muncy,	Pa.	Chas. Ouram.
Wermer, Harvey Eugene,	Allentown,	Pa.	S. G. Bushey.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
West, Morris Fussell,	Kemblesville,	Pa.	F. E. West, M.D.
Weston, Edythe,	Wilmington,	Del.	May Reynolds.
White, Edward R.,	Wilkes-Barre,	Pa.	W. D. White.
Whitman, Wm. James,	Philadelphia,	Pa.	C. H. Bahl, M.D.
Wiegner, Chas. Wm.,	Slatington,	Pa.	J. A. Wiegner, deceased.
Wild, George Frederick,	Logansport,	Ind.	D. E. Pryor.
Wilson, Bryant Braid,	Atlantic City,	N. J.	C. K. Harris.
Wilson, Oliver Fawcett,	Pittsburg,	Pa.	F. W. E. Stedem.
Winger, John Bowman,	Norristown,	Pa.	O. F. Lenhardt.
Wismer, Isaac Gross,	Philadelphia,	Pa.	E. T. Spencer.
Witmer, Daniel Oburn, Jr.,	Taylorville,	Ill.	J. White.
Wokatsch, Richard,	San Francisco,	Cal.	E. G. F. Miekley.
Woltman, Enos Frederick,	York,	Pa.	B. S. Gilbert & Co.
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Young, Asa Harvy,	Easton,	Pa.	Nebus & Richards.
Young, Benj. Lee,	Birmingham,	Ala.	Ellis Drug Company.
Young, James Humphrey, Jr.,	Philadelphia,	Pa.	R. C. Cadmus.
Zentner, Wm. Herman,	Chicago,	Ill.	Lapp Drug Company.
Zullinger, Aaron Henry,	Chambersburg,	Pa.	Greenawalt Bros.

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Armstrong, Walter,	Shenandoah,	Va.	L. C. Funk.
Armstrong, William Edward,	North Adams	Mass.	Special Chemistry.
Arndt, Harry,	Manheim,	Pa.	H. F. Ruhl.
Baddour, Joseph Selim,	Cairo,	Egypt,	Dr. S. Baddour.
Bailey, John,	Dover,	Del.	A. F. Merrell & C. O.
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Bole, Robert,	Harrisburg,	Pa.	J. B. Reynolds.
Bolton, Alfred Harrison, Jr.,	Philadelphia,	Pa.	A. H. Bolton.
Booth, James Lofton,	Biloxi,	Miss.	R. C. Cadmus.
Booth, Wm. Henry,	Danville,	Va.	John L. Hagan.
Boyd, Roger,	Atlanta,	Ga.	Geo. F. Payne.
Boyer, John Clinton,	Loyalton,	Pa.	H. C. Eddy.
Brendel, Frederick Chas.,	Zanesville,	O.	Henry Mueller.
Brockman, Frank William,	York,	Pa.	Dale, Hart & Co.
Brooks, Joseph Warren,	Pensauken,	N. J.	Bullock & Crenshaw.
Brunhouse, Frederick, Jr.,	York,	Pa.	Wm. Smith & Co.
Bucher, Wm. Lewis,	Columbia,	Pa.	Shinn & Baer.
Bundy, Clinton Thomas,	Barnesville,	O.	Geo. W. Goldsmith.
Butz, Newton,	Wescotville,	Pa.	A. Weber.
Brunier, Geo. Franklin,	Philadelphia,	Pa.	B. N. Bethel.
Caffrey, John Boniface,	South Bethlehem, Pa.	Pa.	H. C. Watt.
Cain, Maude Florence,	Lancaster,	Pa.	C. A. Heinitsh.
Campbell, Andrew,	Williamsport,	Pa.	Duble & Cornell.
Carman, Harry Alfred,	Philadelphia,	Pa.	Shoemaker & Busch.
Carpenter, Edward Albert,	Plano,	Tex.	W. L. Matthews.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Carter, Charles Franklin,	Dayton,	O.	H. F. Stover.
Cassell, James Wilson,	North Wales,	Pa.	W. R. Childs.
Chalfant, Charles Joshua,	Unionville,	Pa.	E. D. MacNair & Bro.
Clair, Joseph Sylvester,	Camden,	N. J.	W. P. Weiser.
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Conrey, Henry Slicer,	North Branch,	Md.	Shinn & Baer.
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Gillespie, Wallace Gault,	Philadelphia,	Pa.	Bullock & Crenshaw.
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Grasser, Edward John,	Toledo,	O.	Special Chemistry.
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Herbert, Thomas Lewis,	Philadelphia,	Pa.	Wm. Hummell.
Hering, Edwin Arney,	Altoona,	Pa.	G. W. Kessler.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
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Phillips, William Newton,	Zanesville,	O.	A. J. Kendig.
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Porter, John Morris,	Philadelphia,	Pa.	F. S. Hughes.
Porter, William Edgar,	Meadville,	Pa.	F. K. Easterwood.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
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Smith, John Ritner,	Harrisburg,	Pa.	F. E. Morgan.
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Swartz, Edward,	Hughesville,	Pa.	L. M. Swartz.
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Tarr, Robert H.,	Cleveland,	O.	M. G. Tielke.
Taylor, George Frederick,	Philadelphia,	Pa.	Thomas Craighead.

<i>Name.</i>	<i>Place.</i>	<i>State.</i>	<i>Preceptor.</i>
Terne, Henry B.,	Philadelphia,	Pa.	Bullock & Crenshaw.
Terry, John Herman,	Plano,	Tex.	J. M. Fronefield.
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FRIEDRICH AUGUST FLÜCKIGER.

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FRIEDRICH AUGUST FLÜCKIGER.—

BY FR. HOFFMANN.

As the scope of each of the auxiliary sciences of pharmacy has constantly expanded, the faculties and the life of an individual man are no longer sufficient to grasp the whole domain, or even the ramifications of either of such sciences as chemistry, physics and botany. Division of labor in every direction, therefore, has more and more taken place in the study and pursuit of these sciences. The *universalist*, possible a generation ago, has largely been reduced to the *specialist* among the professors and students of our days. The master minds in pharmacy, conversant with the theory and practice of the various branches of the pertinent sciences, and acting with equal proficiency in more than one, as teachers, investigators and authors, therefore, are also passing away, and are replaced by the specialist. One of the few of these generic stars in the domain of the sciences pertaining to pharmacy of the departing century was Professor Flückiger, who passed away at his home in Switzerland, on December 11, 1894.

Friedrich August Flückiger was born on May 15, 1828, at the village of Langenthal, near Bern, Switzerland. His father was a small merchant, and the boy was educated at the village school, with a view to pursuing a mercantile trade. At the age of seventeen years he entered a commercial institute in Berlin, but his inclination towards the natural sciences seems to have been nursed and to have found encouragement in Berlin, for he soon relinquished the course of the commercial college in order to attend lectures in chemistry, geology and botany at the University of Berlin. In 1847, he entered

a pharmacy in Solothurn, Switzerland, as an apprentice. This introduction into the practice of pharmacy seems to have lasted but three years, for during the two years of 1850 and 1851 Flückiger served as a drug clerk in Geneva and in Strassburg. In the fall of 1851, he entered the University of Heidelberg, where he obtained the degree of Ph.D. in 1852. He worked there in the laboratory of Professor Delffs, and subsequently, for a short time, with Professor Wurtz in Paris. Dr. Flückiger then spent some time in London, where he made acquaintances that were, later on, of much value to him; among them was Daniel Hanbury. He returned to Switzerland, and, in 1853, entered into partnership for the purchase of a pharmacy in the small town of Burgdorf, near Bern. He remained there for seven years, occupying his abundant spare time largely with linguistic, historical and scientific studies, and also with an active participation in the elaboration of the first edition of the *Swiss Pharmacopœia*, published in 1865.

Although Dr. Flückiger had published but few essays, his talents and comprehensive knowledge were soon recognized, and in 1857 the Pharmaceutical Association of Switzerland elected him its chairman, which position he retained, with great benefit to the society, for nine consecutive years. In 1860, Dr. Flückiger was appointed director of the state pharmacy (Canton-Apotheke) at Bern. He gave up his pharmacy and residence in Burgdorf to accept the position; he filled it, and soon, also, that of co-examiner of pharmacists and that of state chemist until 1873. Besides, in 1861, he established himself as lecturer in pharmacy and pharmacognosy at the University of Bern, and in 1870 was appointed to full professorship. His position at Bern in the laboratories of the Canton Pharmacy, as well as in that of the University, afforded Professor Flückiger excellent chances and ample inducements for application and research in the domain of practical pharmacy. He made good use of these opportunities, and with the wealth of his knowledge, the thoroughness in all his work, and with much zeal and assiduity, accomplished during the years of his stay in Bern a large amount of important practical and literary work, including the revision and the editing of the second edition of the *Swiss Pharmacopœia* in 1872, and the elaboration of the first editions of his two greatest works—the “*Manual of Pharmacognosy*,” published in 1867, and “*Pharmacographia*,” published in 1874.

The most significant and honorable recognition of Professor Flückiger's labors consisted in his call by the German Government as Professor of Pharmacy and Pharmacognosy and Director of the Pharmaceutical Institute, established at the reorganization of the old German University of Strassburg in Alsace in 1873. Professor Flückiger accepted this call, and filled the position entrusted to him with success, and with much credit to himself and the University, for nineteen years. In 1892, he retired at the age of sixty-four years and settled at his old home among the snow-clad Alpine ranges at Bern, with the intention of applying his remaining years to literary work, and particularly to collecting and assorting the accumulated material in preparation for the elaboration of a comprehensive history of medicinal plant drugs.

The years in Strassburg were the most prolific, as well as the most useful ones, in Professor Flückiger's indefatigable activity as teacher, investigator and author, and he looked upon them as the most happy ones of his long and successful career. There he enjoyed the attractive and inciting intellectual intercourse with the *élite* of the pharmaceutical students of Germany and of foreign countries, who were drawn thither by the reputation of the great scholar, and who received his instruction in the lecture-room and the laboratory, passed the searching ordeal of his examination, and finally returned home, imbued with a love for knowledge and study for its own sake, and with appreciation of their great teacher and veneration for him.

Upon the retirement of Professor Flückiger from his many years of academic activity, the veteran scholar was the recipient of many honors. The Emperor of Germany honored him by a decoration, the scientists of many countries presented him through a special committee with a magnificent album containing more than 300 photographic portraits, and with a handsome donation as a contribution to the erection of a comfortable home in Bern. Moreover, a committee was formed for the institution of a Flückiger Memorial Fund. The proceeds collected were to remain in the control of this committee, consisting, at the time, of Professors Tschirch of Bern, Schaer of Strassburg, Hilger of Munich, F. Weber of Zürich, and Professor Flückiger. Upon the death of the latter, his place in the committee has to be filled by a person elected by the National Association of Pharmacists of Germany. The object of this memo-

rial fund is the establishment of one or more endowments for talented students in pharmacognosy, and of a Flückiger Medal to be presented at special occasions to distinguished investigators and scholars in the domain of pharmaceutical and kindred sciences and arts. In the course of three years this medal has been conferred upon eighteen gentlemen.¹



At the time when Professor Flückiger entered pharmacy, the domain of chemistry, as well as of botany, could be fairly well mastered by an intellect so richly endowed with the power of ready comprehension and with an unusual memory. A prodigious amount of solid knowledge in all departments of literature relating to pharmaceutical and kindred sciences, and close application, enabled him to keep abreast with the prolific and large accumulation of new facts, resulting from the progress of chemical and botanical knowledge. He early became interested in plant drugs, and his bent towards an historical aspect in all knowledge gradually led his interest and study pre-eminently in this direction. Otto Berg had inaugurated principles and methods of stricter discrimination in the

¹ As the list of the recipients of the Flückiger Medal has been frequently reported incorrectly, the names may here be mentioned as they were recently published by the committee in Bern: John Attfield of London; H. Beckurts of Braunschweig; Born of Buenos Ayres; G. Dragendorff of Dorpat; H. T. Fritzsche of Leipzig; P. Giacosa of Turin; Thom. Hanbury of La Mortola; A. Hilger of Munich; Fr. Hoffmann of New York; Th. Husemann of Göttingen; J. B. Nagelvoort of Detroit; Nyegaard of Christiania; Theod. Peckolt of Rio de Janeiro; Pfersdorff of Strassburg; G. Planchon of Paris; E. Schaer of Strassburg; Alex. Tschirch of Bern; A. Vogl of Vienna.

study and knowledge of plant drugs, and, especially by his text-book of pharmacognosy (1852), and by his master-work, "Atlas of Pharmacognosy" (1865), had laid an exacter scientific foundation for modern pharmacognosy. Upon this basis, Flückiger continued and improved the new structure of this branch of applied science. Fifteen years after the first appearance of Berg's text-book he published one in 1867, and in 1875, jointly with Daniel Hanbury, enriched English literature for the first time by a standard work on pharmacognosy, namely by the "Pharmacographia." These two works, the former republished twice, the latter once, were his chief literary achievements and will remain his most lasting literary monuments. Both works, apart from their comprehensive and thorough treatment of the subject matter, are remarkable for the introduction of a large amount of historical material and data. He recognized the superior value of historical research and cultivated it with all his inquisitive and critical powers. Flückiger became the historian of pharmacognosy and his early demise is the more deeply to be regretted and is the greater a loss to the world of science, as he had in the course of his life accumulated an immense amount of historical material and data, preparatory to his long cherished desire to devote the leisure of his ripe and declining years to the consummation of his life work, namely the writing of a comprehensive history of plant drugs.

The same bent towards the historical aspect in all knowledge lends equal value and charm to his third great literary work, the Text-book of Pharmaceutical Chemistry, published in one volume in 1879, and republished in a largely extended second edition in two volumes in 1888.

Besides these main works Professor Flückiger has published two more concise text-books for the study of pharmacognosy (*Grundriss der Pharmacognosie*, 1884, second edition, 1894, and *Grundlagen der Pharmaceutischen Waarenkunde*, 1873, second edition, 1885), and a chemical work on the application of chemical analysis to organic chemical compounds (*Reactions*).

The number of his miscellaneous writings published in the course of many years is great; they embrace biographical, historical and educational essays, sketches of the culture of plants useful in the industries and arts, and reports on original investigations in the domain of chemistry, pharmacy, pharmacognosy and botany, insti-

tuted by himself or jointly with advanced students during his 30 years of academic activity as professor and director of University laboratories in Bern and Strassburg. Most of Flückiger's writings, and especially the miscellaneous essays, are distinguished by his mastery of a concise style and logical diction, and by the wealth and the depth of his philosophical and historical conception, and therefore are as attractive as they are instructive. Some of his essays may, on account of the beauty and grace of their style and conception, well be ranked among the few classic productions in modern pharmaceutical literature.

As a teacher Professor Flückiger was esteemed on account of his conscientious and painstaking consideration of every detail in the instruction, both on the platform and in the laboratory; he was not so much a fluent as an impressive lecturer. His reputation drew pharmaceutical students from various countries to the University of Strassburg, and not a few of the most eminent pharmaceutical scholars of the younger generation at home and abroad have received his instruction, and by his inspiration have been imbued with a taste for knowledge and research for their own intrinsic interest and value, and for thoroughness in all study. They cling with veneration to the memory of their departed teacher and master.

Professor Flückiger's health had been failing for about one year. Early last year he accepted a long-standing invitation of friends to visit our country, at the same time hoping that the sea voyage during the summer months would prove beneficial to his health. He furthermore expected to search some of our larger public and private libraries for historical material in reference to American drugs, in addition to the accumulated material for his contemplated historical work. After a pleasant voyage from Genoa, he arrived here on the 28th of May, stopping most of the time of his stay in America in Brooklyn, paying brief visits to Washington, Baltimore, Philadelphia and Boston, making a trip to Niagara and resting for a few weeks at a summer resort in the Shawangunk Mountains, N. Y., and at Cape Cod, Mass. At the end of August Prof. Flückiger attended the annual meeting of the American Association for the Advancement of Science, in Brooklyn, and made there the personal acquaintance of many American scholars long and well known to him. He returned to Europe on September 15th, and after a delightful sail to

Genoa, stopped, on his way to Bern, for a few days at La Mortola. Soon after his return to Bern, early in October, a complication of diseases of the alimentary canal set in, and, after an illness of nearly six weeks, he fell asleep at 11 o'clock on the 11th day of December, 1894.

"Sustained and soothed
By an unfaltering trust, he approached his grave
Like one who wraps the drapery of his couch
About him, and lies down to pleasant dreams."

The following is a list of Prof. Flückiger's principal works :

- 1862. Contributions to the History of Pharmacy in Bern.
- 1867. *Manual of Pharmacognosy*, second edition, 1883, third edition, 1891.
- 1873. Frankfort list of drugs. Contribution to the mediæval history of pharmacy.
- 1873. *Elements of Pharmacognosy*. Introduction into its study. Second edition jointly with Dr. Alex. Tschirch, 1878.
- 1874. *Pharmacographia* (jointly with Dan. Hanbury), second edition, 1879.
- 1876. Contributions to the History of Pharmacy.
- 1879. *Manual of Pharmaceutical Chemistry*. Second edition, 1888.
- 1883. *The Cinchona Barks*.
- 1884. *Elements of Pharmacognosy*. Second edition, 1894.
- 1884. The Industry of Essential Oils in Grasse.
- 1885. Historical Sketch of the Pharmaceutical Institute at Strassburg.
- 1885. Pharmaceutical Education in Germany.
- 1886. Contributions to the History of Pharmacy in Italy.
- 1888. Contributions to the History of Pharmacy in England.
- 1889. Easter Vacation in Italy.
- 1892. *Reactions*.
- 1893. Further Contribution to the History of Pharmacy in Bern.
- 1893. British Work and Progress in India.
- 1893. The Industry of Essential Oils and Synthetic Aromatas.

Prof. Flückiger's last contribution to a journal was his description of the Blasckka collection of glass models of plants in the Agassiz Museum in Cambridge, written for the September issue, 1894, of the *Pharmaceutische Rundschau*.

The name *argon* has been given to the new element stated to exist in the atmosphere, and, at a special meeting of the Royal Society on January 31st, Lord Rayleigh and Professor Ramsay are to present their paper on the supposed new constituent, and the matter will then be discussed.—*Phar. Jour. Trans.*

THE CULTIVATION OF LICORICE ROOT IN THE
UNITED STATES. —

BY HENRY N. RITTENHOUSE.

Many interesting accounts of the cultivation of the licorice plant are to be found scattered through the works on materia medica, agriculture and gardening during the past one hundred years, and the methods therein described are essentially the same as those pursued at the present time, and which it is not the intention to reproduce here.

Licorice root is cultivated, in the true sense of that word, in so few places in the world, and to so small an extent as an article of commerce, as hardly to be worth mentioning. One or two places in England, and a like number in France and Germany, embrace all the localities I happen to be acquainted with, and the area of land under cultivation varies from a few rods to an acre or two, five acres being an exceptionally large field.

The large amount of licorice imported into this country, and which also supplies the needs of the world, grows wild, without any care or cultivation whatever. Italy and Spain supply a small percentage of the total amount, probably 5 to 8 per cent., while Southern Russia, along the line of the Transcaucasian Railway, supplies two-thirds of the remainder, and Asia Minor and Syria the other one-third. The total amount of all kinds imported into the United States is about 80,000,000 pounds per annum, on an average. In 1872, the imports were about 5,000,000 pounds, and the consumption still increases yearly.

The licorice plant grows over an area, extending from the shores of the Mediterranean, on the south (latitude 30°), to Siberia, on the north (latitude 55°), and from the western shores of Europe to the plains of Persia and farther India, and from low levels to 1,500 feet above the sea; thus showing over what an immense area of land and variety of soil and climate it will grow vigorously. In Afghanistan it forms the principal fuel. It is a hardy and tenacious plant, almost impossible to eradicate where it once obtains a foothold, and growing without care or cultivation when once fairly started. The mention of these conditions under which the plant, which furnishes the root of commerce, is found, is to illustrate its hardy nature.

As the plant grows wild, and generally on wild and uncultivated land, and is dug and prepared for market by cheap Asiatic and

Russian labor at starvation wages, the first question naturally is, would it pay to grow it in the United States? The answer to this is: if it is intended to grow it as root dried and sold in competition with this wild, imported root, probably not; but to propose and advance such an enterprise is not my object.

Licorice root, as found in commerce, is dried and pressed in bales. The root, when freshly dug, contains, on an average, 50 to 60 per cent. of moisture. This must first be dried out, which is done by exposure to the air, much as hay is made, requiring frequent turnings and handling to prevent, as much as possible, heating, fermenting and darkening during the drying, as well as the wetting by rain or snow, which may be frequent before the root is dry enough to press for shipment. The root, when nearly dry, and danger from further damage from the presence of moisture has passed, is piled up in large stacks until ready to be pressed. Around these stacks are dug ditches for draining the ground, and after a heavy shower, or prolonged period of rain or snow, these ditches will fill with a black water, containing a very strong taste and a high percentage of the extractive matter of the root; this, of course, deteriorates its value and is itself waste. When dry enough, it is pressed in powerful hydraulic presses worked by steam, so as to reduce the bulk to a minimum, and so save freight in shipment. The bales are bound with iron straps, and sometimes covered with canvas.

The plants, which supply the root as found in commerce, have been growing for a long time, some pieces being two to three inches in diameter when dry, indicating probably a growth of twenty or more years; but these very thick pieces are usually rejected as being worthless for making extract, as a root after four years' growth begins to deteriorate in value for the purpose of making extract, because of becoming too woody and fibrous, and lessening the percentage of extractive matter. On the other hand, the very thin fibres of one year or less growth are equally worthless, yet the shipper works in as much of both kinds in the bales as he dare, to say nothing of adhering soil and debris. Root of three years is the most desirable, if it could be obtained, as being the richest in extractive matter.

It will be seen from the above that the preparation of licorice root for market, as we find it, is a tedious and expensive process—first, the organization of the business, in the employment of clerks,

superintendents and a host of minor officials to superintend the diggers, receive and weigh the root at the various stations appointed in different localities, pressing, shipping, etc. The right to dig over a certain territory is obtained by lease or tithe, as the land is owned by the Government, the church, the village, or by individuals. Then there are the digging, drying, curing, pressing and baling, inland transportation, ocean freights, insurance, fire and marine, bankers' and brokers' commissions, interest and loss of weight in transportation. These expenses alone, throwing aside the cost of the freshly dug root, will represent fully 75 per cent. of the price of the root ex-ship in the United States. The foregoing expenses are fixed and unavoidable, as the fresh root could not be transported, owing to its perishable nature. These considerations have led me during the past four years to investigate the feasibility of growing this plant in the United States.

The consumption of the extract in this country is now so large and important, especially in the manufacture of chewing tobacco, that in case of a European war, a blockade of the Black Sea at the Dardanelles, or the Mediterranean at Gibraltar, would effectually cork up the world's supply, and throw the large American industry of tobacco-manufacturing into confusion. As licorice has become a more or less important ingredient in most brands of chewing tobacco, and the present generation of chewers has become so accustomed to its use, new brands omitting this ingredient might be unsalable.

Referring now to the vast and varied area over which the licorice plant grows wild, and the great variety of soil and climate in the United States, as well as cheapness of land and labor, and the ability to obtain large tracts of land of comparatively easy accessibility for transportation and labor, has led me to present the following information on the subject, of what I believe can be made a new and profitable industry in this country, with money and time intelligently expended. I believe it would, in time, pay better than either sugar cane, sugar beets, rice or cotton, although the industry would not be as large or important as any of those, which are all exotic, the cultivation of all of them having been begun in a very small way in the United States.

Licorice extract can be made as well, or better, from fresh root than from the dry, and is so made in the countries that furnish the

root; but the duty on it of five cents per pound restricts largely its importation, while the root is free.

The thought I have in mind, in introducing the growing of licorice here, is very much on the same lines as sugar is now made from cane and beets; that is, to have large tracts of land devoted exclusively to the growth of the plant, with the factory for making the extract from the fresh root in, or near, the fields. The present sugar factory, too, could easily be adapted to the manufacture of the licorice extract, the apparatus required being simply suitable crushers or shredding machinery, the diffusion battery and vacuum pans for evaporating. Sugar factories, too, could be utilized when not running on sugar, as the proper time for digging the root is from October to April, and if the root is not needed one year, it can be left in the ground until the next, not only without deterioration, but to its increased value in weight. It is not well, however, to allow the root to exceed five years in growth; three or four year root is the richest in extractive matter; as it becomes older it becomes more fibrous. Frost or drought do not injure the root when once well established; young and tender plants in the first year might be injured. The elaborate and expensive methods of culture, followed by the gardeners of Europe, would be entirely unnecessary here on a large scale. After selecting a suitable tract of land, having the necessary requirements of soil, location, etc. (prairie land, because it is open and easily tilled, would be my choice), it need only be plowed once to turn down the grass and weeds, harrowed, then laid out in furrows about 25 to 30 inches apart, and the buds or cuttings, set in the rows 6 or 8 inches apart, and covered by a plow, throwing a furrow over the buds from each side, or even cover them 3 or 4 inches with a hoe; this is all. From time to time, during the growing season, a cultivator should be run between the rows to keep down weeds or grass. The tops, at the end of the growing season, should be cut off; this could be done with the mowing machine. The second and third year the treatment would be the same. In the fall of the third year the crop would be ready to harvest. The cost of harvesting would be the most expensive part of the business, and thus far I am unable to give any exact figures, but up to the point of harvesting, the cost of planting and cultivation would not exceed \$4 per acre per annum, or \$12 for the three years, including interest and taxes. As the root grows to a great depth in a light soil, if digging had to be

resorted to, the expense would be more, and some other mechanical means would have to be used, as a plow or digger. All the world over, digging by shovel and pick is the usual method; one reason for this is because labor is very cheap, and another is, the plants grow in patches often widely apart, and individual plants, so scattered over such an extensive area that no other plan is possible, while in the field, as proposed, the plants would be in rows and an acre very thickly grown.

An acre, with the rows 30 inches apart and the plants in the rows 6 to 8 inches apart, would contain 20,000 plants, and narrower rows and closer planting is permissible, so that many more than 20,000 plants can be grown to the acre. I prefer to take 20,000 plants per acre as a unit for calculation, to allow for loss in many ways of a liberal percentage, say one-third, by failure to grow and by dying after starting, etc. The growth each year is not so much in weight as one might be led to think by reading what has been written on this subject; but so far as I have been able to ascertain, there is nothing at all definite and specific published. The information herein is of my own investigation and experiment, and is only offered as approximate, as indeed the whole subject must be considered as still in an experimental stage, but, in my opinion, full of promise if properly entered upon with a view to making it a commercial success.

By obtaining plants from the growers of one, two, three and four years' growth drying and weighing them, I get the following results: plants of three years' growth will average when dried four ounces, equal to eight ounces fresh; or to an acre of 20,000 plants 10,000 pounds as the crop at the end of the third year, costing, according to my estimates for growing and harvesting, \$15 for the crop of 10,000 pounds of fresh root, at the end of the period of three years.

I have not given the weights of the other root, as three year root is the basis on which I am working; four year growths would show much larger results, and younger roots are too immature to dig.

Allowing a loss in various ways of one-third the plant, leaving 13,300 yielding $\frac{1}{2}$ pound each of fresh root, or 6,650 pounds at the end of the third year at a cost of \$15, or even \$20, and the enterprise would be profitable. The 6,650 pounds of fresh root represents one and a half tons dry, and the lowest price at which dry Russian Root, or Asiatic, can be laid down in the United

States, is about £8 per ton ; the crop of a ton and a half would be worth \$60, costing \$20, or a net profit of \$40 per acre for the three years, equal to \$13 per acre per annum as the profit of growing the root ; but if the fresh root is at once made into extract, as I propose, the profit would be much greater even at 4 cents per pound, just half the present price of the extract.

My own experience in growing the plant in the United States has thus far been very moderate in results, owing to causes that might have been prevented, viz.: inundations, unsuitable buds for planting, and possibly a want of care or interest, or experience, on the part of those in charge, to say nothing of the effect of unusually hot and dry weather on the young plants before they had become acclimated. I have grown the plants in several places in New Jersey, Pennsylvania, Louisiana and Florida, and still have some growing in the different localities, and believe it to be quite a feasible matter to introduce the industry on a large scale.

In 1856 W. R. Prince, of Flushing, L. I., contributed an article in *The Horticulturist*, Phila., on the cultivation of licorice root in the United States, showing the possibility of it. In 1854 the Department of Agriculture published in its annual report an account of its cultivation in this country.

In 1886 Mr. Isaac Lea, of Florin, near Sacramento, Cal., grew several acres very successfully, but abandoned it for want of a home market and for more profitable use of the land occupied by it. There are still some plants growing on that farm as well as in several other places in California. Mr. Lea was an enthusiast on the subject of growing the plant on a commercial scale, and had visited Louisiana and Florida with the object of establishing the enterprise in one or the other of those States ; but finally abandoned the project for personal and domestic reasons. I mention these facts to show that the plant has been grown here by practical men whose opinion was that it could be grown on an extensive scale, but who knew nothing of the manufacture of the extract from it.

This paper is far from being exhaustive of the subject ; much practical information has been accumulated and my experiments are still going on, and I believe with the necessary capital invested in the business on a sufficiently large scale, it need not be many years before the entire wants of this country, of licorice paste, could be supplied from the home-grown root, as indicated.

STRUCTURE OF IRIS.—

BY EDSON S. BASTIN.

The Blue Flag, *Iris versicolor*, *Linné*, is one of the commonest of monocotyls in the eastern United States. The range of its habitat is from Canada to Florida, and from the Atlantic as far West as Minnesota and the Indian Territory. Its rhizomes are horizontally creeping, from 16 to 24 cm. long, more or less branched, and composed of joints, each from 3 to 10 cm. in length, and representing a year's growth. Each joint at or near its base is cylindrical or only slightly flattened, but toward its apex is larger and widened hori-

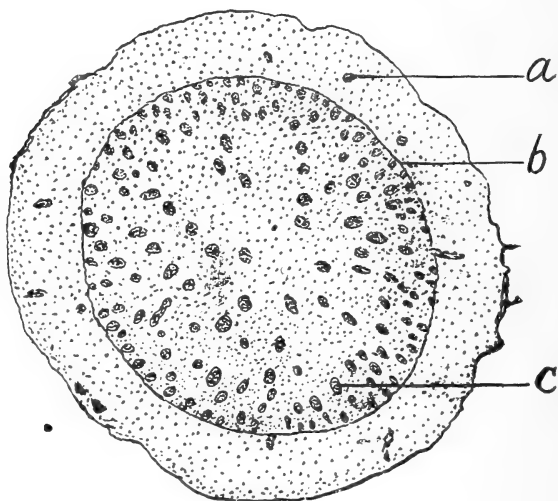


FIG. 1.

zontally. At the anterior end on the upper surface of each joint is a more or less cup-shaped scar of a flowering stem. At this end also may occur two, or sometimes four, lateral branches arranged opposite each other in pairs. The surface of the joints is densely covered with scales consisting of the fibrous bases of the decayed leaves, and from the inferior surfaces, chiefly from the broader, flattened portion of the joints, spring numerous, sparingly branching, wrinkled rootlets, averaging 10 or 12 cm. long and about $1\frac{1}{2}$ mm. in thickness. These, together with the scales, are usually removed in preparing the drug for market. The dried drug, therefore, shows, except occasionally near the apex of the rhizome, only the crowded

ring-like scars of the leaves and the small circular scars of the rootlets.

The rhizomes are also longitudinally wrinkled from shrinkage in

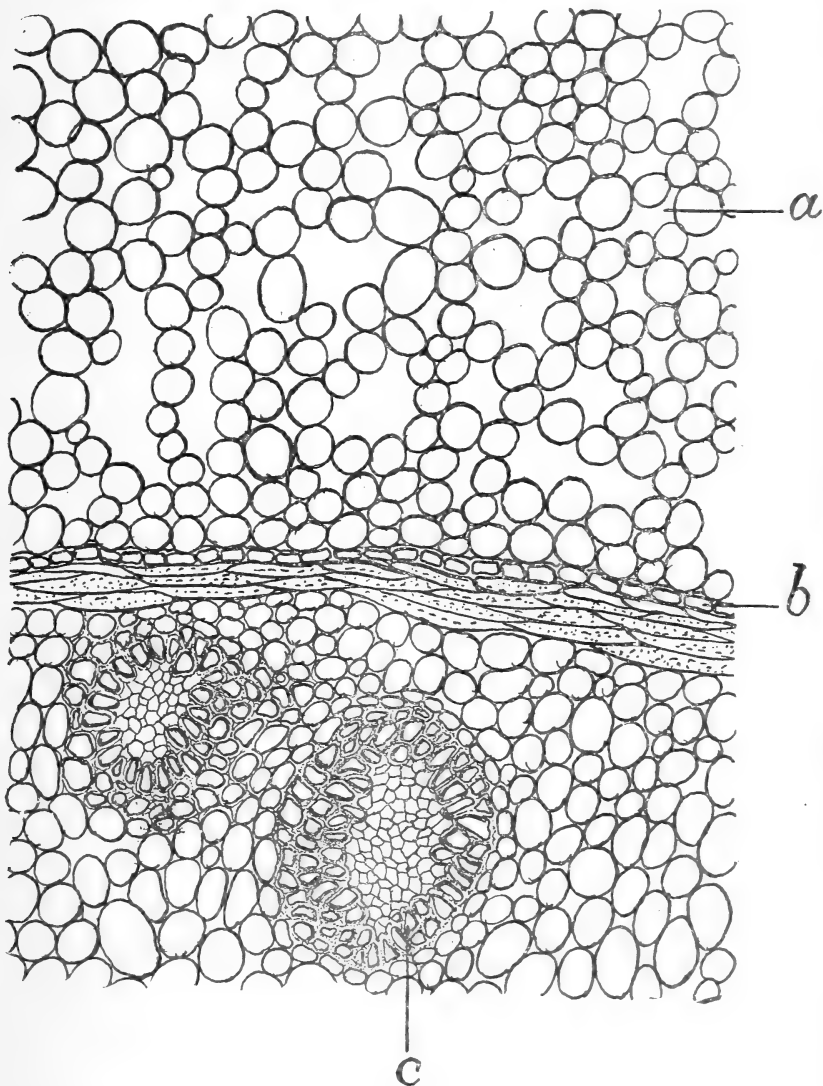


FIG. 2.

drying, are commonly banded transversely with different shades of brown on the outside; the fracture is short, and the fractured surface is usually brownish or grayish brown.

A transverse section of the rhizome shows a distinct cylinder-sheath separating the central cylinder, which contains numerous scattered vasal-bundles, from the cortex, which contains relatively few. The thickness of the cortex, compared with the central cylinder, is about as one to five. The sheath proper consists of a

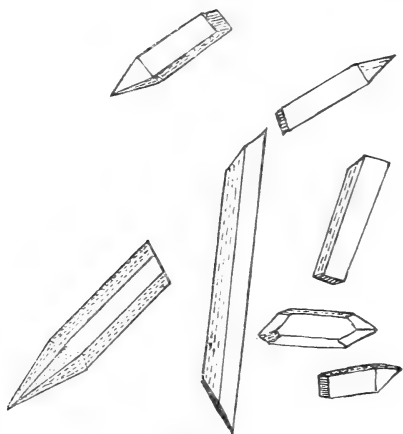


FIG. 3.

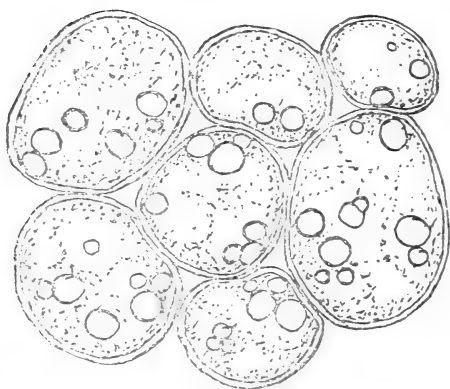


FIG. 4.

single row of tangentially elongated and thickish-walled cells, but is strengthened interiorly by two or three thicknesses of tangentially elongated, somewhat fibrous cells.

The vasal-bundles of the central cylinder are much more crowded toward the exterior of the cylinder next the sheath, and are mostly smaller than the more scattered ones toward the centre of the stem.

The bundles consist of that modification of the concentric type in which the xylem elements are exterior, and the phloem tissues central, and, as seen in transverse section, the bundles are either circular or somewhat elliptical in outline. The ducts are of rather small

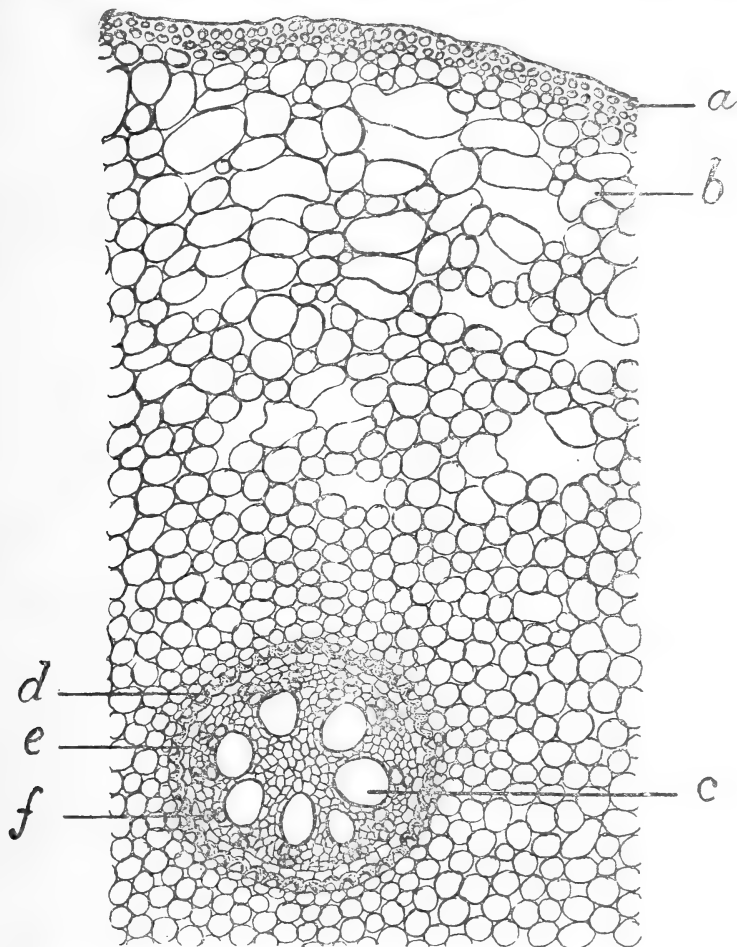


FIG. 5.

size. Each bundle has an imperfectly developed sheath of thin-walled cells, differing little from the cells of the adjacent parenchyma except in their smaller size.

Aside from the xylem elements of the bundles and the cylinder-sheath with its strengthening layer of fibrous elements, the tissues

of the rhizome are unligified. The cortex and fundamental tissues of the central cylinder consist of loosely arranged parenchyma. The cells of this parenchyma are notably unequal in size, and the intercellular spaces, though often large, are not regular either in size or in arrangement as they commonly are in the stems of other aquatic and marsh plants.

The parenchyma cells abound in rounded granular particles which look remarkably like starch grains, but which do not polarize light, and which stain brownish instead of blue with potassium-iodide iodine. In chloral-hydrate iodine they swell and gradually disappear, but without acquiring the blue color of ordinary starch. If sections be treated with a 15 per cent. solution of alpha-naphthol, afterwards with sulphuric acid, and then heated, the grains disappear and an intense violet color will be gradually developed in the tissues. This test justifies the suspicion that the grains, though behaving in some respects like proteid, may really be carbohydrate in their character, related to, if not in fact a modification of starch. But this matter requires further investigation.

There occur in the parenchyma, both of the cortex and of the central cylinder, rather numerous isolated crystals of calcium oxalate in the form of large-sized, mostly elongated and pointed prisms, which, between the crossed Nicols, show beautiful polarization effects.

The cross-section of a rootlet shows a structure so characteristic that it might be employed readily in the identification of the drug. The epidermis consists of two or three layers of rather small and thickish-walled cells. The cortical parenchyma consists of very unequal-sized, quite loosely arranged cells, with irregular intercellular spaces. The central bundle is from ten to fifteen rayed. The rays terminate interiorly in about six or eight large ducts, which form a circle about a small pithy central portion. The endodermis is composed of cells very distinct from those of the adjacent tissues. Its cells are of nearly equal size and excessively thickened in their inner and radial walls, which are also lignified, while their exterior walls remain thin and unligified.

DESCRIPTION OF FIGURES.

Fig. 1.—Diagram of cross-section of rhizome of *Iris versicolor*, the section passing through near the base of one of the joints; *a*, a vasal-bundle in the cortex; *b*, cylinder-sheath; *c*, a vasal-bundle in the central cylinder. Magnification, 6 diameters.

Fig. 2.—Small portion of cross-section of same rhizome more highly magnified, showing portions of cortex, cylinder-sheath and central cylinder. *a*, in tercellular space in cortex; *b*, cylinder-sheath; *c*, xylem of one of the bundles in exterior portion of central cylinder. Magnification, 100 diameters.

Fig. 3.—Crystals of calcium oxalate from rhizome. Magnification, 150 diameters.

Fig. 4.—A few parenchyma cells from central cylinder of rhizome, showing granules similar in appearance to starch grains. Magnification, 495 diameters.

Fig. 5.—Portion of cross-section of root of *Iris versicolor*, magnified 100 diameters. *a*, epidermis; *b*, cell of cortical parenchyma; *c*, large duct in vasal-bundle; *d*, endodermal cell; *e*, pericambium cell; *f*, small ducts at exterior end of xylem ray.

IODIDES OF TIN.

BY CHARLES BULLOCK.

Iodide of tin has been called for recently in medical practice for its supposed benefit in some forms of pulmonary disease.

Tin forms with iodine two compounds—stannous iodide, SnI_2 , and stannic iodide, SnI_4 . *Stannous Iodide* is formed when iodide of potassium is added in slight excess to a solution of stannous chloride. The solution must be made free from excess of acid by long digestion at a moderate heat in a flask over mossy tin.

The iodide is precipitated as a yellow-red powder, somewhat gelatinous in character. When thrown upon a filter the filtrate is quite acid, and the iodide when washed soon turns white by decomposition, forming oxide of tin and hydriodic acid. If heated in a flat porcelain dish without washing it evolves hydriodic acid and changes to a brown-red powder. The best method was found to be the drying of the precipitate immediately between folds of bibulous paper. In this condition it still remains acid when dry.

Stannous iodide crystallizes in yellowish-red needles; it dissolves slightly in water and soon decomposes with formation of hydriodic acid and oxide of tin. In warm solution of the chlorides and iodides of the alkali metals it dissolves freely. When heated to near redness in the absence of air it liquefies, but does not sublime; on cooling, it solidifies into a crystalline mass, which affords a yellow-red powder. When heated in an open vessel it is resolved into stannic iodide, which sublimes, and oxide of tin is left.

Stannic Iodide, SnI_4 (tetra iodide) is obtained when tin and iodine are brought together in a dry state. To prepare it, tin in a granular condition is placed in a flask, and twice its weight of

iodine gradually and carefully introduced. To prevent violent reaction it is recommended to moisten the tin with carbon disulphide before introducing the iodine, but this is not necessary if proper caution be used. The contents of the flask liquefy by the heat generated; when the reaction is over, the flask is heated and shaken to insure complete combination. When cold, the iodide solidifies to a mass having a chocolate color, and crystalline in structure. The mass was placed in a porcelain dish, covered with a funnel having a long neck with a small flask on the top. It melts at about 150° C., and the stannic iodide sublimes at about 180° C., collecting in the funnel in yellow-red octohedral needles. The stannous iodide which forms part of the mass does not sublime when air is excluded even at a red heat. By this method the two iodides can be separated.

Stannic iodide has a specific gravity of 4.69, it is soluble in carbon disulphide, absolute alcohol, methyl alcohol, ether, chloroform, benzol and oil of turpentine. It is quite sparingly soluble in water; the aqueous solution soon decomposes into hydriodic acid and stannic oxide.

It is not clearly stated which of the two iodides is wanted for medical purposes, and, as their therapeutic effects may vary very much, more information is wanted before they can be dispensed with safety.

Specimens of the two iodides are herewith submitted.

PHARMACEUTICAL NOTES.

BY F. W. HAUSSMANN.

IRON IN COMMERCIAL GLYCERIN.

The practice of keeping glycerin in tinned iron cans, often for a prolonged time, will have the effect of contaminating the same with traces of the metal.

As special inducements are usually offered by the wholesale dealers to buy this liquid in lots of 50 pounds, cans of this capacity containing the same are generally found in retail pharmacies, and often form the only stock container, with the consequence of the above-mentioned contamination.

In many operations, both in the laboratory and on the prescription counter, the delicate iron reactions produced with certain com-

pounds are productive of color changes, which are at times difficult of explanation.

These may be produced by impure articles, in this instance the iron-contaminated glycerin.

In a number of instances, where glycerin was kept in the containers mentioned, such reactions were produced and found at times to be the source of considerable trouble.

It is hardly necessary to mention the various iron reactions, as they are found in every chemical text-book.

But to the pharmacist a few are of importance, as they are liable to occur at the dispensing counter, when the presence of a trace of iron in commercial glycerin is not suspected.

PREPARATIONS OF TANNIN AND GALLIC ACID.

In the popular glycerite of tannin we find the preparation not unfrequently to turn a blackish-brown color, no matter how careful we may be in the handling of our working utensils.

Examination of the glycerin, which appears to contain the metal in the ferric form, will reveal the cause of the coloration.

Extemporaneously prepared nipple washes, containing tannin, or similar preparations, are apt to show the same effect, as will also preparations containing tannin-like principles.

In connection with this, attention may be called to the presence of tannin in commercial alcohol.

The average pharmacist accepts this most important solvent from his dealer without even attempting a superficial examination as to its purity, and does not recognize the importance of the same until he finds color changes in delicate preparations.

Elixirs containing scaled iron salts often show this result, and the question: Why does elixir iron, quinine and strychnine turn dark after standing a short time? may find partly an explanation in the tannin-containing alcohol of commerce.

Such alcohol, or preparations made therefrom, when mixed with glycerin kept in tinned iron cans, will show the same effect.

EFFECT UPON PHENOL COMPOUNDS.

The delicacy of the iron reaction with phenol compounds is well known.

Carbolic acid is frequently prescribed in a mixture with glycerin

and if the latter is not free from iron, a red coloration is sure to take place.

This was observed with a perfectly colorless sample of the acid.

Salicylic acid, in particular its sodium salt, is a compound which is readily affected in this manner. The fact that a perfectly colorless aqueous solution of this salt, when mixed with glycerin, turned to a reddish violet color, first drew the writer's attention to the presence of the metal in the latter.

Similar effects can also be observed with other aromatic compounds, especially with a number of the new remedies, such as antipyrine, salipyrine, etc.

The following prescription was the subject of a controversy between a physician and a pharmacist:

Tinct. Guaiaci,
Glycerini, āā ℥ i
Aquæ Rosæ, ℥ ii.

When this mixture was dispensed, it was found to acquire a blue color on standing.

This took place either with or without the presence of gum arabic, thereby proving the same not to be a factor in the change.

An examination of the rose water failed to find any oxidizing agents, but an examination of the glycerin revealed the presence of iron.

The same prescription was sent to several reputable pharmacists to be compounded for the sake of comparison, almost invariably showing the same result, with only one exception, indicating the presence of iron in glycerin to be quite general.

Other color reactions, produced by this impurity, may also take place, but a consideration of analytical principles will enable the well-informed pharmacist to satisfactorily explain the cause of any such changes.

THE ADDITION OF GLYCERIN TO BORAX PREPARATIONS.

The fact that glycerin, when added to aqueous solutions of borax decomposes the latter with formation of free boric acid is well known.

The frequently asked query: What is the cause of the effervescence in preparing Dobell's solution? finds its explanation in this manner, also the pharmacopœial identity test for glycerin.

The same reaction may take place in other instances, perhaps less frequently, yet being at times of importance at the dispensing counter, occasionally requiring some reflection before unlooked-for phenomena are satisfactorily explained.

Some weeks ago a mixture consisting of aqueous tincture of rhubarb and glycerin was found to explode when dispensed in a well-filled bottle.

When this mixture was prepared in an open vessel, distinct effervescence could be observed on standing.

Tinctura rhei aquosa, a preparation frequently prescribed by German practitioners, contains, besides the active vegetable ingredient, borax and potassium carbonate.

The glycerin decomposes the sodium borate, with liberation of free boric acid, and the latter is again neutralized by the potassium carbonate present with evolution of CO_2 .

The expansion of this gas renders the bottle holding this mixture liable to fracture.

BORAX IN UNGUENTUM AQUÆ ROSÆ.

Several objections have been made against the addition of borax to the cold cream of the new Pharmacopœia.

The action of the borax upon salts of mercury and the alkaloids appears to be the chief objection.

The addition of glycerin to cold cream, as sometimes ordered extemporaneously in prescriptions, will also decompose the borax in the manner mentioned.

Borax appears to possess some saponifying action upon the fatty ingredients, and if glycerin is subsequently added, boric acid is liberated, changing the reaction of the ointment from alkaline to acid.

It would be interesting to know whether this would produce an impairment of the preparation as to its medicinal value.

GLYCERIN AND SOME BAY RUM SAMPLES.

The pharmacopœial bay rum formula is not satisfactory to many pharmacists on account of the almost colorless appearance of the product.

In their efforts to cater to the popular taste, they prefer to have the preparation of a bright yellow, or even yellowish-brown color.

To effect this, some follow the practice of macerating bay leaves or turmeric, or both, in the solution of the oils, while others add solution of potassa to the oils of bay and allspice before dissolving them in alcohol.

Some also dissolve a certain amount of borax in the water before it is added to the alcoholic oil solution.

Still others use the potash solution and make the borax addition besides.

When the last method is employed the bay rum will possess a handsome yellow color

But if the preparation, thus prepared, is mixed with glycerin, the effect repeatedly mentioned takes place, namely, the borax is decomposed and the acid liberated.

This effect may readily be observed after the glycerin addition.

The mixture will decolorize, the yellow color almost entirely disappears, and the previously alkaline bay rum will turn distinctly acid to test paper.

Other illustrations may be mentioned, where chemical incompatibility may arise between borax and glycerin, but a little reflection will readily indicate the liability of its occurrence.

In the preparation of toilet washes, in which it is desirable to keep the borax unchanged, this fact must be considered with care.

One point we may perhaps call attention to, namely, the chemical incompatibility of borax with fluid extracts and tinctures containing glycerin.

Astringent fluid extracts, such as those of sumach berries, rose, etc., as a rule, contain glycerin, and it is well known that these preparations enter frequently into mouth washes containing borax.

VINEGAR OF SQUILL.

Considerable variation appears to exist in the color of this preparation.

As usually found in the United States it is yellow, due to the employment of the white variety of the drug in its preparation.

Occasionally, however, we find the red variety of squill in our market, and this is especially the case with the ground drug.

Vinegar of squill, made from this variety, is red-brown, appears to have a more pronouncedly bitter taste, which it will communicate to the syrup made therefrom, and which will also have a similar color.

As the syrup is a frequently sold article, the altered taste and color is at times regarded with suspicion by the consumer.

Having occasion to examine a number of samples of the vinegar, the writer noticed in several the odor of acetic ether. Further examination revealed also the presence of alcohol. Such vinegars mostly had a cloudy appearance, and a sample, prepared by the writer from the fluid extract, according to the formula of a certain manufacturing firm, possessed the identical properties after standing, both in odor and appearance.

Fluid extract of squill, a preparation largely alcoholic, appears to have been used in the preparation of these vinegars, and consequently the alcohol and acetic acid entered into combination to form acetic ether.

On heating the vinegar, the latter is dissipated, together with the excess of alcohol, hence the odor of the ether is not so prominently noticeable in the syrup made by heat.

The practice of "easy preparation" of this official vinegar should be discouraged.

It is not only a flagrant disregard of the Pharmacopœia, but a preparation of this kind will, by its odor, reveal the professional principle of its maker.

ULTRAMARINE IN SYRUPS.

The addition of this pigment to sugar by the refiner, for the purpose of "whiting," the same, is to the pharmacist at times the source of not a little trouble, not alone in the preparation of medicinal syrups, elixirs and allied saccharine preparations, but also in the manufacture of soda water flavors.

The altered appearance of the finished syrup, differing from the expected colorless preparation, showing the same to possess a brownish tint, is a frequent source of chagrin, although liable to happen when made from the best variety of granulated sugar.

The Pharmacopœia recognizes this fact, and requires large volumes of syrup not to deposit any sediment on standing.

From a chemical standpoint another factor may be noticed, equally important as the mentioned physical change, namely, the occasional evolution of hydrogen sulphide from certain syrups.

This has probably been noticed by many pharmacists, but the odor has been erroneously attributed to the "souring" of the syrup; in other words, to fermentation.

From the fact that evolution of the hydrogen sulphide gas only took place in the syrup, containing free acids, the writer drew the conclusion that it must be due to another cause.

A number of experiments led him to the conclusion that the source laid in the ultramarine, added, as already stated, for the purpose of "whiting."

To understand the reaction, by which the evolution of the gas is produced, the composition of the pigment must be briefly noticed.

The exact constituents are not well known, but ultramarine is stated to be mainly a mixture of aluminum silicate, containing traces of iron, together with various sodium compounds, predominant among which is the sulphide. When free acids act upon the latter, hydrogen sulphide is evolved.

If this takes place in medicinal syrups, it is recognized by its odor or by suspending a strip of white paper moistened with lead acetate solution in the air space above the syrup in its container.

Syrups containing mineral acids claim our first attention. Of these the most important official ones are those containing free phosphoric or hypophosphorous acid, also the syrup of hydriodic acid.

These acids will decompose the blue readily in the manner mentioned.

The action of acids upon the pigment is not confined to inorganic acids, but the organic produce a like effect.

Among the latter may be mentioned citric, acetic, tartaric and oxalic acids.

Syrup of the former acid, official in the Pharmacopœia, is not rarely affected, as well as the hypophosphite syrup of the last Pharmacopœia, which also contained this acid.

Syrups containing acetic acid, such as ipecac, garlic, and squill, will also show the same effect, although in not as characteristic a manner, as, for instance, in the case of garlic syrup one odor will mask the other.

Among other official syrups likewise subject to this change, syrup of gum arabic may be mentioned.

The mucilage of acacia has an acid reaction, and its mixture with simple syrups, containing ultramarine in suspension, will be found to acquire an offensive odor on prolonged standing.

Incidentally may be mentioned, that the same effect is noticeable in

Jackson's pectoral syrup, although the odor is masked by the presence of oil of sassafras.

Even simple syrup itself, when turning somewhat sour, will have the odor of the gas, if the ultramarine has not been carefully removed.

Of inconvenience this fact will also be found in the manufacture of soda syrups, especially those containing free acid or acid fruit juices.

The repulsive odor of some fruit syrups, after undergoing this decomposition, is thereby explained.

It is noticeable at times that the ultramarine in syrups containing free acid gradually disappears on standing.

The pigment is usually not found in acid syrups prepared by heat, as decomposition of the blue takes place more rapidly during this procedure.

Syrups containing free alkali, such as rhubarb and senega, do not evolve sulphuretted hydrogen, as the ultramarine remains unaffected by alkalies.

Incidentally the recommendation of the Pharmacopœia, to prepare syrups by cold percolation, must be called wise and practical. If carefully prepared and preserved, it not only obviates the possibility of recrystallization of the sugar, but will also remove foreign matter, which will at times occasion deposits or even induce fermentation.

In the presence of the ultramarine pigments the intervention of the sponge will remove the blue in neutral or alkaline syrups.

Even if it should be decomposed in syrups containing acids, the exposure of the same, being yielded drop by drop in the course of its preparation, should be sufficient to expel all appreciable traces of the hydrogen sulphide gas.

NOTES ON SOME SAPS AND SECRETIONS USED IN PHARMACY.—

BY P. L. SIMMONDS, F.L.S.

There are very many of these which deserve special detailed notice, at all events as to their medicinal uses and statistics.

Four subdivisions might be established under which all the varieties of gums and resins might be grouped:

- (1) Gums.
- (2) Resins.
- (3) Oleo-resins.
- (4) Elastics and gums.

The first would include all gums, wholly or partially soluble in water, whether of the Acacia or Tragacanth kind.

The second would include resins more or less soluble in alcohol, such as copals, mastics and gum resins, like asafoetida and ammoniacum.

The third would include turpentine, wood oil and balsams.

The fourth would contain India-rubber, balata and gutta-percha, with substances of a similar character.

A resin is entirely soluble in alcohol, but insoluble in water. A gum resin is intermediate in character between a gum and a resin; that is to say, it is partly soluble in water and partly soluble in alcohol.

A kino is the astringent inspissated sap of a tree.

The resins may be divided into four groups:

- (1) Solid or dry resins.
- (2) Turpentine.
- (3) Balsams.
- (4) Soft resins.

Perhaps it is better to arrange the products alphabetically under their botanic names.

Abies balsamea, Marshall; *Abies balsamifera*, Michaux; *Pinus balsamea*, Lin.

Canada balsam is an oleo-resin produced from the stem of this tree by incision, and is also yielded by *Pinus Fraseri*, Pursh.

It is of a pale straw color, and is occasionally used medicinally, but is chiefly employed for mounting objects for the microscope, and as a fine transparent varnish for water-color drawings, which does not become darker with time.

Abies excelsa, Poiret; *Pinus picca*, Du Roi.

Pinus Abies, Lin. The resinous exudation of the Norway spruce fir, melted and strained, furnishes the concrete oleo-resin, true Burgundy pitch, the Thus or Frankincense of the London Pharmacopoeia. The common frankincense or American Thus is from *Pinus palustris*, Lambert; *Pinus Tieda*, Lindl. It acts as a counter-irritant, and is applied to the chest in chronic pulmonary complaints,

to the loins in lumbago, and to other parts to relieve local pains of a rheumatic character.

The Indian gums are coming in largely into European commerce to supplement the African gums, the exports of gums for India having averaged 37,000 cwt. in each of the last five years. The African gums may be recognized from Indian gums by an expert, being of a different shade of color, often with a pinkish hue. The imports of gum arabic into the United States have declined by more than one-half of late years; in 1892 they were only 417,000 pounds, but recovered in 1893 to 915,855 pounds.

Acacia Catechu, Willd. The extract from this tree, known as "cutch," is used medicinally as an astringent, in fevers and other maladies, and the better qualities are equally as good medicinally as the Gambier of Singapore.

There are several kinds of cutch made in India and used in medicine.

A resinous extract is prepared by boiling down chips of the wood.

In Burma and Bombay the decoction is boiled down to a solid consistence and thrown into leaf moulds, or is baked into cakes and balls. This is the ordinary cutch of commerce, and instead of being a pale grayish color, it is deep reddish-brown, with a glassy fracture.

Another inferior kind is made from a decoction of the nut of the betel palm (*Areca Catechu*.) This form exists in large slabs, about an inch in thickness, prepared on the leaves of the Teak tree. This substance is, however, rarely exported from India, but a considerable local trade is carried on in it in Madras and Mysore.

Cutch is prepared thus :

The tree is cut down to about six or twelve inches from the ground and chopped into small pieces, the smaller branches and bark being rejected. The chopped wood is then taken to the place of manufacture, generally under trees in the open air, and placed over a brisk fire in clay jars, filled with about two-thirds of water.

This is allowed to boil down till, with the extracted matter, it forms a liquid of a syrupy consistence. The contents of several jars are then poured into a larger jar, and again placed over a brisk fire for a period of from two to four hours, and, when sufficiently boiled down, it is poured over mats covered with ashes of cowdung and allowed to dry.

Catechu is used in medicine as a gentle tonic and a powerful astringent, on account of the large quantity of tannic acid (50 per cent.) which it contains. Combined with opium it answers a good purpose as an internal remedy in chronic diarrhœa, catarrh or dysentery.

Cutch is not specified in the American imports, but gambier is named, but appears among gums, with the old misnomer of "*Terra japonica*." The quantity imported fluctuates between 27,000,000 and 35,000,000 pounds.

SUGARS.—The maple tree, several palms, the white beet root, sorghums, the sugar cane, and other plants and trees, yield saccharine saps, but as the product of these have chiefly dietetic uses, rather than medicinal, I shall not enter into details on them.

Aloes Species.—The simply inspissated juice of the leaves of various species of this gum constitutes the "aloes" drug of pharmacy. It is best obtained by using neither heat nor pressure for extracting the sap. By redissolving the aqueous part in cold water and reducing the liquid through boiling to dryness, the extract of aloes is prepared. All species are valuable in localities where they are hardy, and can be used (irrespective of their medicinal importance) to beautify any rocky or otherwise arid spot.

Aloe Ferox, Lamarck.—This yields the best Cape aloes, as observed by Dr. Pappe. Other species, such as *A. perfoliata*, Lin., also yield the drug. *A. africana*, Mill., and *A. plicatis*, Mill., and *A. commelini*, Salm., are said to yield a less powerful kind.

The following are also South African species: *A. arborescens*, Miller; *A. linguæformis*, Mill.; *A. angulata*, Willd. From this species the purest gum resin is obtained.

A. purpurascens, Haworth, is one of the plants which furnish the Cape aloes of commerce. *A. spicata*, Lin., also provides Cape aloes. *A. Zeyheri*, Harvey, a magnificent, very tall species, is doubtless valuable like the rest. *A. soccotrina*, Lamarck, is also indigenous to South Africa; *A. dichotoma*, Lin. fil., in Damara and Namaqualand, attains a height of 30 feet and expands occasionally with its branches so far as to give a circumference of 40 feet. The stem is remarkably smooth, with a girth sometimes of 12 feet. It is a yellow-flowering species. *A. Bainsii*, Baker and Dyer, is almost as gigantic as the foregoing. Both, doubtless, yield the medicinal gum resin, like several others.

In many parts of the Colony of Natal, a wild aloes is very abund-

ant, and a few people make an industry of the preparation of the product for export. Shipments, of late years, have reached £400 in value. Small balls of it were shown in the Natal Court at the Colonial Exhibition in London.

A. indica, Royle.—There are many varieties of aloe met with in cultivation throughout India, some of which have gone wild, as, for example, on the coast of South India. The inspissated juice, as a medicine, is regarded as an aperient and deemed highly beneficial to persons predisposed to apoplexy. The fresh juice from the leaves is said to be cathartic, cooling and useful in fevers, spleen and liver disease, enlarged lymphatic glands, and as an external applicant in certain eye diseases. The pulp of the leaves is, in native practice in India, applied to boils and is regarded as acting powerfully on the uterus. It is largely employed in veterinary medicine. The root is supposed to be efficacious in colic. *A. soccotrina*, Lamarck; *A. vera*, Miller, is usually imported in skins and casks from Bombay. Soccotrina aloes may be recognized by its reddish tint and by the fragments being nearly transparent, as well as by its odor. *A. Perryi*, Baker, is indigenous to the island of Socotra. In very large doses it is a powerful hepatic stimulant. In small doses the drug is used as a stomachic tonic, in larger doses purgative and, indirectly, emmenagogue. It is a remedy of great value in constipation caused by hysteria and atony of the intestinal muscular coat. It is also very useful in atonic dyspepsia, jaundice, amenorrhœa and chlorosis. Locally applied, dissolved in glycerin, it is valued in India as a stimulant application in skin diseases, and, for this purpose, is generally combined with myrrh, constituting the *Musanbar* of Bombay.

Hepatic aloes is a species of Arabian aloes, so called from its liver hue. It is duller and more opaque in color than other kinds, more bitter, and has a less pleasant aroma than the Socotrine aloes itself, but is believed to be the sediment deposited in Socotrine aloe juice.

A. vulgaris, Lamarck and Bauhin; *A. vera*, Lin.; *A. Barbadosensis*, Miller, has long been cultivated in the Antilles, and furnishes from thence the main supply of the Barbadoes and Curacoa aloes.

This West Indian aloes may at once be distinguished by its disagreeable odor.

There are two varieties met with in commerce, one presenting a brown, the other a black fracture; the former is the best.

The culture in Bar adoes is confined to the small farmers entirely,

and is carried on chiefly in the parish of St. Philip, towards the sea-shore, where the soil is scanty and dry. The produce of an acre of land is about 140 pounds of extract. The plants require to be renewed about every fourth year.

It is this species which Professors Willkolm and Parlatore record as truly wild in countries around the Mediterranean Sea, on the sandy or rocky sea coasts of Spain and Italy. Haworth found the leaves of this and of *A. striata*, more succulent than those of any other aloe.

Barbadoes aloes is usually imported in gourds, breaks with a dull conchoidal fracture, and has a bitter taste. Socotrine breaks with an irregular or smooth and resinous fracture, has a bitter taste and a strong but fragrant odor.

In my work on "The Commercial Products of the Vegetable Kingdom," published as far back as 1853, I described the production and commerce in Aloes, but much information has been published since then. The imports into London have been falling off of late years.

In 1890 the receipts were 7,360 cases and packages and 622 gourds; in 1892, they were only 2,652 cases and 277 gourds.

Anacardium occidentale, Lin.—The trunk and branches of the cashew-nut tree yield, on being wounded, during the monthly ascent of the sap, a white and transparent gum, similar to that of arabic. A full-grown tree will furnish an annual amount of ten or twelve pounds. The fresh acid juice of the flower stalks is used in lemonade; wine and vinegar are made by fermenting it.

Anogeissus latifolia, Wall.—The gum from this Indian tree occurs in clear, straw-colored, elongated tears, adhering in masses, sometimes honey-colored, or even brown from impurities. As an adhesive gum it is inferior in strength to gum arabic, in consequence of which it commands a much lower price in Europe, the more so since it is nearly always mixed with the bark of the tree, sand and other impurities.

BALSAMODENDRON SPECIES.

B. Ehrenbergi, Berg.—This species of the deserts of Arabia yields myrrh, and some other species produce the same resin. Professor Oliver unites this with *B. opobalsamum*, Kunth, which furnishes Mecca or Gilead balsam.

B. africanum, Arnott; *Heudelotia africana*, Rich.; *Amyris niotout*, Adans.

African bdellium is translucent, but has a dull fracture. The taste is slightly bitter.

B. katas, Kunth; *Amyris katas*, Forsk., furnishes the gum resin or African bdellium, which reaches Bombay from Berbera, the purer kinds very much resembling myrrh in perfume. The opaque bdellium of Guibourt is used for the extraction of the Guinea worm. It is of a yellowish white color, resembling ammoniacum.

B. mukul, Hooker, of Scinde and Beloochistan, furnishes the Indian bdellium, or "Gugul," which is used in native medicine as a demulcent, aperient, carminative and alterative; especially useful in leprosy, rheumatism and syphilitic disorders. It is also prescribed in nervous diseases, scrofulous affections, urinary disorders and skin diseases, and is employed in the preparation of an ointment for bad ulcers. A fragrant balsam is obtained in Arabia from the fruit of this species. The African bdellium is the product of another species.

B. myrrha, Nees.—This tree of Arabia and Africa yields the myrrh of commerce, which occurs in the form of tears, of irregular shape, of variable size, and of a yellow or reddish-yellow color, light, brittle, somewhat translucent, and at times shining. Fracture vitreous or conchoidal, of a bitter aromatic taste and peculiar smell. It contains a volatile oil, was used in ancient times as "frankincense," and is still so employed in China. Myrrh is used as a stimulating medicine, and as an ingredient in tooth powders. Bombay is the chief port at which myrrh is received and shipped. Four kinds are imported there: the African or true myrrh, which is considered the best quality; the Arabian, the Persian (source unknown), and the Siam. On the bags arriving at that port, they are opened and sorted into the different kinds.

The Aden agents of Bombay houses attend the annual fair at Berbera, and exchange goods for the gum resins. The bags or bales, when opened in Bombay, are found to be made up of (1) a large proportion of roundish masses of fine myrrh; (2) of a considerable proportion of small, semi-transparent pieces of myrrh of irregular shape; (3) of numerous pieces of dark-colored myrrh, mixed with bark and other refuse; (4) a small proportion of an opaque bdellium. When sorted the best myrrh goes to Europe, the darker pieces form a second quality and the refuse is exported to China, where it is probably used as incense.

Myrrh is beneficial in dyspepsia, amenorrhœa and chlorosis, and a

useful astringent to all ulcerations or congestions of the mucous membrane. It makes a valued wash for the mouth and gums and a gargle in ulcerated sore throat. It is a stimulant, expectorant, and much admired as a remedy for pulmonary affections, especially the asthma of the aged. Hakims, in India, use it for intestinal worms. It is detergent, siccative, astringent and aperient, a disperser of cold tumors and one of the most important of medicines, as it preserves the humors from corruption. Dissolved in milk it is dropped in the eye in purulent ophthalmia. It is useful in humid asthma and chronic catarrh, also in chlorosis and defective menstruation. Dose, in pill, powder or emulsion, 10 to 30 grains; of tincture, $\frac{1}{2}$ to 1 fluidrachm.—Dr. George Watt.

B. opobalsam, Kunth; *Amyris opobalsam*, Lin.—This tree furnishes the balsam or balm of Gilead, which is not a true balsam, but an oleo-resin of a consistence like that of Chian turpentine. It has a fragrant odor and warm, aromatic taste, and was held in high esteem by the ancients, and accredited with a variety of medicinal properties. As a cosmetic and perfume it is still largely employed by Turkish ladies. There are references to it by many ancient writers, among others, Theophrastus, Dioscorides, Pliny and Galen, and also many mentions of it in the Bible. So highly prized was this balsam that, during the war of Titus against the Jews, two fierce contests took place for the orchards in Jericho, where it was produced, the last of which was to prevent the Jews from destroying the trees that the trade might not fall into the enemy's hands. The gardens were taken formal possession of as public property, an imperial guard was appointed to watch over them, and it appeared that the emperor increased their size and endeavored to propagate the plants. The imperial care was unavailing, for not a branch of the balsam tree is now to be found in all Palestine. The shrub was taken to Arabia and grown in a recess in the mountains between Mecca and Medina, whence the balsam is now exported, not as balm of Gilead, but balsam of Mecca. The substance is still eagerly sought for in Egypt and the East under this name. It is obtained by making incisions in the trunk or branches, but the yield is very small, only averaging three or four drops per diem. This fact accounts for the comparative rarity and the great costliness of the genuine article, as also for the numerous substitutes and imitations of the original. There are three qualities produced by art; the first and best is the opobalsam,

expressed from the green berry and leaves; the second is the carpobalsam from the ripe seed or berry; and the last is obtained by bruising and boiling the young wood. The twigs, possibly after boiling, are sent to Venice, where they enter into that heterogeneous compound—Venice treacle.

B. Roxburghii, Lin.—This yields a gum resin of a greenish color, moist and easily broken, having a peculiar cedar-like odor.

Boswellia Carterii, Birdwood.—The Frankincense of commerce. This stimulating gum resin is also obtained from *B. Frereana* and other species; it is used medicinally and as a perfumery incense. The European frankincense is, however, distinct, being a resinous exudation from the spruce fir, used in the composition of plasters.

Olibanum consists of tears, often an inch in length, of an ovate or oblong clavate or stalactite form, and mixed with impurities. The pieces are light yellow to brown, pale green or colorless. There are two varieties, one of which is far inferior to the other. The best is found in pieces as large as a walnut, of a high yellowish color, inclining to red or brown, covered on the outside with a white powder, the whole becoming a whitish dust when pounded. It burns with a clear and steady light, not easily extinguished, and diffuses a pleasant balsamic and resinous fragrance. This drug is constantly burnt as incense in the Hindu temples, under the names of "Khomda" or "Kunda" and "Luban," and also in Roman Catholic churches.

Bombay is the port from whence the greatest quantity is exported. England receives from 7,000 to 8,000 packages yearly. Olibanum is rarely used in medicine in Europe, but in India it is regarded as a demulgent, aperient and alterative, acting chiefly on the lungs and as a purifier of the blood. It is there used in rheumatism, nervous diseases, scrofulous affections and skin diseases. It is regarded as a diaphoretic and astringent, and is employed in the preparation of an ointment for carbuncles, boils, ulcerations and other sores. As a fumigating agent, it is employed to overpower unpleasant odors and to destroy noxious vapors.

B. glabra, Roxb., also yields this fragrant resinous substance. It is bitter and pungent; mixed with "ghee" or fluid butter, the native doctors prescribe it in gonorrhœa and other complaints.

B. serrata, Stackh., is sometimes called the Indian olibanum tree. Of this there are two varieties, one being the *B. thurifera* of Roxb.

burgh and Colebrooke, and the other *B. glabra*, noticed above. The gum resin occurs as a transparent golden yellow semi-fluid substance, which hardens with time. It has a slightly aromatic and balsamic resinous odor.

B. Thurifera, Coleb.; *B. serrata*, Stackh. This and some other species yield the gum resin. It has astringent and stimulant properties. Externally, it is useful as a rubefacient and antispasmodic, especially as a plaster in cramps of the stomach.

[To be continued.]

THE APOCYNACEÆ IN MATERIA MEDICA.

BY GEORGE M. BERINGER.

(Continued from page 46).

In structure the fruit of *Holarrhena Antidysenterica* approaches, in the main, that of *strophanthus*. Externally, is the epidermis with cells distinct and thickened on the outside. The mesocarp is formed of a fundamental tissue in which the cells are not flattened or pressed, but are distinctly visible without the aid of potassa. These cells have granular contents, the walls reddish-brown, and in the external zone, thickened nearly collenchymatous.

The internal region forms a fibro-vascular zone with white or yellowish white, very thick fibres, and vascular fascicles rounded or flattened, and with numerous laticiferous vessels. The endocarp is analogous to that of *strophanthus*.

The seeds of *Holarrhena* are quite small, 10 to 20 m.m. in length, 2 to 2½ m.m. in breadth, and 1 to 1½ m.m. in thickness. It requires forty of these seeds when dry to weigh 1 gramme. The shape is oblong, straight, elongated; the extremities somewhat attenuated, but blunt. The lower extremity is somewhat pointed, the upper bears a sort of collar, a very small swelling, upon which is inserted the characteristic tuft of hairs, but in commerce, these hairs are always absent. The seed is flat, or rather plano-convex, the dorsal face a little rounded, the ventral face flat or even concave in grooves. The margins of the seed enroled a little toward this face, which is ordinarily marked by a small, whitish line extending from one extremity to the other. The color varies from a pale fawn or cinna-

mon with a little greenish, even to a chocolate brown. It is dull and ordinarily uniform.

The surface presents always quite large ridges, due to drying, but is not regularly and finely striated, as are those of *Wrightia*. Viewed with a lens, it is finely granulated, or even rugose. The fracture is easy, ordinarily greenish white, or at times brownish. The odor, while not marked, upon crushing approaches that of *Strophanthus*. The taste is frightfully bitter.

Macerated in water the seeds rapidly give to the liquid a disagreeable and nauseating odor and dissociate into their three elements. The envelope, brown and quite thin, often carries away with it the albumen in the form of a thin, peripheral sac of the embryo. The embryo is large, brownish; the cotyledons are refolded several times upon themselves, a little rumpled, but not rolled up. Five large nerves, well marked, start all at the base. The radicle is conical and relatively short. Sulphuric acid slowly produces, with the transverse section, a yellow coloration, changing to orange and finally red. The active principle is an alkaloid first isolated by Haines in 1858, and to which he gave later the name *conessine*. Stenhouse, in 1864, isolated from the seeds the same principle under the name, *Wrightine* and recently Warnecke obtained the *Wrightine* in a crystalline state.¹ The name *Wrightine* is still erroneously retained, as *Wrightia* does not yield this substance.

In India this drug is considered a valuable remedy against maladies of the bowels, especially dysentery. Its use is constant as a febrifuge, astringent and bitter tonic. It was imported into Europe toward the middle of the last century. Antoine de Jussieu employed it in 1730 and compared it with *simaruba*. It is said to be an excellent astringent, useful in dysentery, diarrhœa, vomiting of cholera and all inflammations of the digestive tract. It is used in hemorrhages, angina, as a lithontriptic, and as an antipyretic. Externally it is employed for hæmorrhoids, itch, ulcers, etc., and has given good results in epizooty. The thick red fixed oil extracted from the seeds is considered an anthelmintic.

¹ Herr Warnecke obtained on analysis of *Wrightine* figures corresponding to the formula $C_{11}H_{13}N$, and it is interesting as one of the few solid, non oxygenated alkaloids occurring in nature.

FRUITS WITH A FLESHY PERICARP.

These are classified as Toxics and as Comestibles.

A. TOXICS—THE SEEDS OF THEVETIA NERIIFOLIA. The *Thevetia neriifolia* Juss. (*Ahouai neriifolia* Plum., *Nerio affinis angustifolia* Pluk., *Cerbera foliis linearibus* Plum., *C. Thevetia* L., *C. peruviana* Pers.), is indigenous to the West Indies, but has been introduced into India and the warmer parts of Asia, where it is frequently cultivated as an ornamental garden shrub and is employed here as in the country of its origin. In America the common names employed are: Ahouai, Yoire, Alelia de Matto, Jaca, Serpents nut, etc. in India: China Korobee, Kolkaphul, Exile or Yellow Oleander. It is an elegant small tree, with hard, white wood, with very fine grain; the leaves are linear, close together, alternate, nearly sessile, entire, shining, with a prominent mid-vein, very straight for their length (12 c.m. by 1 c.m.); the flower is large, yellow, fragrant; the bud resembles that of the Nerium.

The fruit is very characteristic, it is trigonal, $3\frac{1}{2}$ c.m. by 4, and about $2\frac{1}{2}$ c.m. thick, with the angles and borders blunt. At one of the angles is inserted the long peduncle and about this the five calycinal pieces; a circular line extends around the circumference of the fruit, and upon the broad upper margin is a small papilla. The fruit is at first green, then becomes black, shining; at maturity the surface is somewhat folded, the consistence is quite soft, the brownish pulp adhering to the stone. The endocarp is extremely hard, ligneous, yellow to brown in color. The kernel is very oily, bitter, and produces in a few moments a slight sensation of numbness on the tongue.

The active principle is *Thevetine*, isolated by DeVrij and studied by Blas and by Warden. It is a glucoside, crystallizable, splitting up by diluted acids into glucose and *Theveretine*, and which the experiments of Dumoutier show to be a tetanic; it is extremely bitter, possesses a metallic taste followed by a tingling of the tongue.

Warden has obtained from the mother-liquor, after the preparation of Thevetine, a yellow, amorphous, bitter substance, soluble in water, which appears much more active than Thevetine, and explains the extreme toxicity of the kernels.

Warden has discovered in the seeds and in the bark also a material, *pseudo-indican*, which was isolated as a yellow amorphous sub-

stance, probably a glucoside, and which yields with hydrochloric acid a blue coloration.

The seed of *Thevetia neriifolia* is a powerful poison, ordinarily considered an acrid narcotic, producing violent convulsions and gastro-intestinal phenomena. It has been employed as a purgative in rheumatism and dropsical conditions in the dose of one-half kernel. It is especially as a febrifuge that it is used along with the bark. In certain regions of America the seeds are considered a good alexiteric; two of the seeds pulverized are macerated in rum, the liquid drunk in fractions and the expressed pulp applied to the wound.

THE FRUIT AND SEEDS OF AHOUI.—The *Thevetia Ahouai* A.DC. (*Cerbera Ahouai* L.), is a native of Brazil, and is distinguished from the *Thevetia neriifolia* by having relatively broad leaves. The seed are identical with the preceding and possess the same properties and usages.

THE SEEDS OF YCCOTLI.—The *Thevetia Yccotli* A.DC. (*Cerbera thevetioides* Kunth), of Mexico, is one of the most poisonous of the Apocynaceæ. The *T. ovata* A.DC., *T. cuneifolia* A.DC., var. *Andrieuxii* and *T. glabra*, all these species and varieties are known in the state of Jalisco as Narcisos amarillos.

The tree is named Yccotli, Icotli, Yccali, Joyottli, or Joyote. The Aztec word is Joyottli, which Hernandez transformed into Yccotli, adopted by DeCandolle as the specific name. The fruit is a drupe, with two papillæ on the sides, rich in latex in the whitish mesocarp and contains a stone, a bony endocarp, yellowish, with four seeds or more often, two by abortion.

Herrera has separated from the seeds a non-drying fixed oil, by expression; another oil by ether and a white glucoside, crystallized, inodorous, non-volatile, very acrid, *Thevetosine*. Carpio has shown that the two oils are toxic in action upon pigeons, but not upon rabbits, and that the *Thevetosine* is extremely poisonous, emetic by action on the nerves, paralyzing the respiratory muscles first and then the other muscles and causing death by slow asphyxia. The substance has likewise some of the properties of the Digitalins.

The Mexicans use the seeds principally against hæmorrhoids, cutaneous maladies, ulcers and tumors. It seems likewise to be used to cure the bite of the rattlesnake.

THE SEEDS OF THE TANGHIN.—The celebrated ordeal poison of Madagascar, the *Tanghin* is furnished by the *Tanghinia venenifera* Poir. (*Cerbera Tanghin*, Hook. *Cerbera venenifera* Stend., *Tanghinin veneniflua* Boj., *T. madagascariensis* Dup.—Th.). The tree inhabits Madagascar, especially the forests of the north and the eastern sides of the island. It is cultivated in the hot-houses of Europe, but has not fructified. It attains a height of ten metres. A bluish-white latex, very poisonous, abounds in all parts of the tree. The fruit and seeds are the only parts employed. The leaves are remarkable for their elongated shape, lengthily acuminate, their soft consistence and the black color which they assume in alcohol or by drying.

The fruit is a drupe, in the fresh state yellow or reddish, shaped like an egg or a peach, and in which the external region is a fleshy sarcocarp, fibrous and includes a ligneous, stony endocarp, which contains a single kernel. The shell resembles in form and appearance of the surface that of an almond.

The structure of the seed is analogous to that of *Thevetia*.

The toxicity of the kernel of the *Tanghin* is such that a single seed suffices to cause the death of a number of persons, according to some, as many as twenty. This kernel is frequently employed in its native country for the poisoning of criminals and the heads of the arrows are likewise frequently coated with the poison. But the reputation of Tanghin comes especially from its use as a legal poison in the ordeals or judicial trials.

The first physiological experiments were by Ollivier, who ranks the poison with the acrid narcotics. Then Pelikan and Kölliker, who employed the leaves and dry branches, concluded that there was a muscular action, and at the same time, or even before, a nervous action. J. Chatin, in 1873, admits, as a result of his experiments with the kernels, that it destroys the muscular irritability without reaching directly the nervous system. It is a paralyzer of the heart, acting equally by way of the stomach, or subcutaneously; more quickly by the latter way. The effects are obtained on the invertebrate animals likewise.

[*To be Continued.*]

EDITORIAL.

F. A. FLÜCKIGER.

The pharmaceutical profession, in both continents, has met with an irreparable loss in the death of Professor Flückiger.

Such a thoroughly disciplined and well-stored mind is rarely found in any individual, and when, as in his case, that rich treasury of facts was about to be recorded for the enlightenment of all mankind, the loss is especially to be deplored.

We have been fortunate in securing a sketch of his life for the *JOURNAL*, from the pen of his friend Dr. Hoffmann, yet we cannot refrain from here calling attention to the peculiar style of Flückiger's writing, as illustrated in the *Pharmacographia*. A master of several languages, with the facts stored where he could use them, and with a clear and concise style, he was able to write so as to impress the duller reader with a force that was fascinating. It is fittingly said by Dr. Hoffmann that some of his writings "may well be ranked among the few classic productions of modern pharmaceutical literature."

THE CULTIVATION OF LICORICE ROOT.

This is a subject which has often been talked and written about, but the industry has never taken that practical turn which is necessary in all such enterprises.

We give on another page an account of the whole subject as seen and understood by a practical man, who has for some years made this subject a special study.

With the immense tracts of undeveloped land in the United States at our disposal, there is no apparent reason why the whole amount of licorice root used in this country should not be grown here.

We hope to be able to give further information concerning the progress of this industry at an early date, as we understand steps have been taken towards its development.

NEW YORK COLLEGE OF PHARMACY.

A magnificent new building has been erected by the New York College of Pharmacy, and was occupied at the first of the present term. The formal opening, with appropriate exercises, took place Friday evening, December 28, 1894.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

LABORATORY EXERCISES IN BOTANY. By Edson S. Bastin, A.M., Professor of *Materia Medica* and Botany, and Director of the Microscopical Laboratory in the Philadelphia College of Pharmacy. Philadelphia: W. B. Saunders, 1895. Pp. 540.

This work is divided into two nearly equal parts: Part I, Organography; and Part II, Vegetable Histology.

The first exercise, under Part I, takes up roots, and the student is told how to practically examine a specimen of dandelion root. A full-page plate illustration accompanies the text. The external characteristics are first considered, and then the internal structure. Drawings are directed to be made of the root

as a whole, and of the inner structure. A pocket magnifying glass, or better, a simple dissecting microscope, is all the apparatus recommended at this stage of the work.

Stems and various other parts of plants are then systematically treated, the study of seeds completing this part of the book.

The exercises in Part II are prefaced by an illustrated description of the compound microscope and accessory apparatus, together with a statement of the preparation and properties of the more important micro-reagents. Staining fluids, permanent mounting or enclosing media, processes of mounting, drawing microscopic objects and general directions for work, also form important parts of the introduction. The first exercise in Part II takes the study of a typical vegetable cell, and the onion is selected as the most available material. The study of leaf structure occupies the closing exercises.

The author says in his preface that this book had its birth in the laboratory, and every page bears evidence that this concise statement is literally true.

Being an earnest advocate of practical study, and being one who carries his theories into practice by spending his time in the laboratory or in the field, Professor Bastin has mapped out a course which none but the hopelessly stupid can fail to follow. There is no work like it in the pharmaceutical or botanical literature of this country, and we predict for it a wide circulation outside of the author's own classes.

The illustrations of plant structures were all drawn by the author from natural objects, and are especially noteworthy. The mechanical part of the book has been very carefully attended to.

THE PHYSIOLOGY OF THE CARBOHYDRATES: THEIR APPLICATION AS FOOD AND RELATION TO DIABETES. By F. W. Pavy, M.D., LL D., F.R.S. London: J. and A. Churchill, 1894. Pp. 280.

The author has long been recognized as an authority on this subject, and he very properly remarks in the preface that "a life's labor, attended with unceasing laboratory work, has been devoted to the attainment of the knowledge that has been acquired." The book, therefore, is not a compilation; it represents a mass of facts laboriously acquired. The titles of some of the chapters will indicate the ground covered; for example, there is a chapter devoted to each of the following subjects: *Transmutation of Carbohydrates, Glucosides, Description of Analytical Steps of Procedure, Ingested Carbohydrates Traced to the Portal Blood, The Liver in Relation to the Sugar Derived from Ingested Carbohydrates, The Liver in Relation to Constituent Sugar, The Blood in Relation to Sugar, The Urine in Relation to Sugar.* A number of other equally important chapters, followed by one on the *Author's Conclusions*, completes the work.

The conclusions reached are: That the old glycogenic theory must be abandoned; the liver, instead of forming sugar, prevents its entry into the general circulation, and thus secures escape from diabetes; carbohydrate matter, through the influence of living protoplasm, undergoes (1) transmutation, (2) application to the production of proteid, (3) transformation into fat.

It will thus be seen that the subject is a far-reaching one, and embraces the whole subject of health and disease.

The book deserves the closest study at the hands of the physician as well as

the chemist. There is not a dull page in it. The author is either describing an interesting series of experiments, or else he is drawing conclusions which he almost compels one to accept by his forcible and logical description.

A MANUAL OF ORGANIC MATERIA MEDICA AND PHARMACOGNOSY. By Lucius F. Sayre, Dean of the School of Pharmacy, Professor of Materia Medica and Pharmacy in the University of Kansas. Philadelphia: P. Blakiston, Son & Co. 1895. Pp. 555.

Professor Sayre issued a work in 1879, entitled "Organic Materia Medica and Pharmacal Botany," which has been out of print a number of years. The present volume is in a slight degree a revision of that work.

Part I, of about 85 pages, treats of Pharmacal Botany, and Part II, comprising 385 pages, is devoted to Organic Materia Medica and Pharmacognosy. In this part the author adopts two systems of classification:

(1) Arrangement of drugs according to their most prominent physical characteristics.

(2) Arrangement according to botanical relationship.

The former is quite brief, but by a system of numbers, a drug in this class can readily be found in the second class, where it is fully described.

In the second class each drug is treated systematically as follows: Botanical Characteristics, Habitat, Description, Constituents, Action and Uses, Official Preparations. There are 543 well-executed illustrations distributed through the work, and they add very materially to its value.

Appendix A. Insects Injurious to Drugs. Under this title, eight pages of illustrated matter are given, which cannot but be of value.

Appendix B. Organic Remedies Formed by Synthesis. Over forty pages are devoted to brief descriptions of what might be termed the newer *materia medica*.

Appendix C, treats of Pharmacal Microscopy. A glossary and full index complete the work.

The book is modern in every sense. It is modern in the order of treatment and in the facts detailed. The student will find it an indispensable companion, and the pharmacist and physician can turn to it as an excellent work of reference.

The publishers have done credit to themselves on the mechanical part of the work.

THE PRINCIPLES AND PRACTICE OF AGRICULTURAL ANALYSIS. VOLUME I, SOILS. By Harvey W. Wiley. Easton, Pa.: Chemical Publishing Company. 1894.

This work is coming out in parts, and was noticed soon after the appearance of the first number. Now, that the first volume has been completed, a brief review of the same may be of interest.

The author has in this volume succeeded in clearly giving the principles which underlie the science and art of the analysis of soils and the best approved methods of conducting it.

An introduction gives a brief description of soils and their origin. Then sampling, physical properties, and mechanical analysis are briefly described. Chemical analysis of soils is then taken up in detail, in which the most modern

methods of estimating nitrogen, phosphoric acid and a number of other constituents are concisely stated.

Appropriate illustrations accompany the text and aid the explanations.

It is a creditable work, and the first one of any magnitude on this subject that has been attempted in America. We predict for it a wide circulation. It is the intention of author and publishers to issue Volume II in monthly parts of 48 pages each, and complete it during the present year.

DICTIONNAIRE D'ANALYSE DES SUBSTANCES ORGANIQUES INDUSTRIELLES ET COMMERCIALES, par Adolphe Renard. Paris: Baudry et Cie. 1895. 8vo. Pp. 438.

This little work, arranged alphabetically, seems to cover a tolerably wide range of subjects, as it deals with the outlines of analysis of most of the technically important organic products.

Many of these are of pharmaceutical interest, as the essential oils, glycerin and fatty oils, alkaloids, sugars, soaps, tannins, resins, inks, wines and coloring matters, both natural and artificial.

Indeed, it covers very much the same ground as "Allen's Commercial Analysis," but in a much more condensed form. We notice that reference is made to the original journal literature in many cases, so that fuller details may be looked up if needed.

The illustrations are few and rather indifferent in their execution. The book, however, can serve an excellent purpose in readily indicating the most convenient methods of analysis and pointing out fuller information on most of the subjects. It seems to be thoroughly modern in its statements and references, and, from a casual examination, to be trustworthy.

S. P. S.

KOLA. An Illustrated Monograph on Kola, issued by the Scientific Department of Frederick Stearns & Co., Detroit, Mich.

This pamphlet of seventy-eight pages places in a compact and readable form a considerable portion of the existing information regarding a product whose medicinal action and economic value are claiming attention. It is another example of the enterprise of American manufacturers, and will, no doubt, tend to popularize and disseminate much useful information concerning this drug.

In scientific writings, the title, "Monograph," should be restricted to contributions which exhaustively *elaborate* and *extend* the existing knowledge on special subjects, and is here inappropriately used for a collection of four essays.

Part I, devoted to Kola pharmacognosy, is disappointing, as it contains scarcely any suggestions of original work by the writer, being largely a compilation from the excellent monograph of MM. Heckel and Schlagdenhauffen. Abstracts from this exhaustive contribution appeared ten years ago in the *Pharmaceutical Journal and Transactions* and in Christy's *New Commercial Plants and Drugs*, and the wording of a considerable portion of the pamphlet before us shows that this English translation has been extensively borrowed by the present compilers. To the chemistry and botany nothing of importance is added to our knowledge of ten years ago.

The probable economic value of Kola as a source of chocolate has not

received attention. Nor has the practical pharmacy, the best method of preparing and exhibiting the remedy, been treated.

Part II.—The physiological and therapeutic action is likewise a compilation from standard works on therapeutics and pharmacology, and not a single original experiment is described. The physiological action of Kola is undoubtedly due to the *caffeine* and the *tannin* contained therein. It is attempted here to assign undue importance to the physiological action of the slight amounts of theo-bromine and the glucoside, *kolanin*, present in the Kola-red of Heckel.

Part III.—A clinical study of Kola is a reprint of an able article by Dr. John V. Shoemaker, citing a number of cases in which Kola had been exhibited with benefit.

The closing part, a chronological index of the literature relating to Kola, is, perhaps, to the student of pharmacognosy, the most valuable.

G. M. B.

ORGANIC CHEMISTRY, Part I. By W. H. Perkin, Jr., and F. Stanly Kipping. Philadelphia: J. B. Lippincott Company. 1895. Pp. 302.

This work is designed for advanced classes as an introduction to organic chemistry.

Part I constitutes the whole of the present volume, and "deals with the fatty compounds." It contains a general account of the methods most frequently employed in the separation, purification and analysis of organic compounds, and in the determination of molecular weight.

The preparation and properties of typical compounds are then described, attention being directed to those changes which come under the heading of general reactions rather than to isolated facts regarding particular substances. By this means practical exercises accompany theoretical considerations.

Considering the size of the volume, a vast amount of valuable information is condensed into it, and it can be recommended to those taking an advanced course in organic chemistry, as well as to teachers as a work of reference.

DIE CHEMIE DER KOHLENHYDRATE UND IHRE BEDEUTUNG FÜR DIE PHYSIOLOGIE. Rede, gehalten zur Feier des Stiftungstages der militärärztlichen Bildungs-Anstalten, am 2. August, 1894. Von Professor Dr. Emil Fischer. Berlin, 1894. Verlag von August Hirschwald.

This address of thirty-six pages deals with the history of the carbohydrates during its greater part, and then discusses the theories of the present day.

FORMULAIRE DES MÉDICAMENTS NOUVEAUX ET DES MÉDICATIONS NOUVELLES POUR 1895. Par H. Bocquillon-Limousin. The sixth edition of this work contains the following additions, chiefly in the line of synthetic remedies: *Alangine*, *Alæ pictum*, *Alphol*, *Antipyonine*, *Bromethylformine*, *Acide cathartinic*, *Chlorate de soude*, *Cristalline*, *Diaphtol*, *Di-iodoforme*, *Ferratine*, *Gaiacol-iodoforme*, *Gallate de mercure*, *Glycerophosphates*, *Glycozone*, *Iodoformine*, *Iodure de Rubidium*, *Lorétine*, *Lycétol*, *Manacine*, *Naphtol di-iodide*, *Nectandra amara*, *Neurodine Paico*, *Paraforme*, *Résol*, *Salicétol*, *Salumine*, *Sérothérapie*, *Suc pulmonaire*, *Sulphocaféate de soude*, *Tannal*, *Thermidine*, *Thioforme*, *Vasogène*. Some of these are not new to the American pharmacist, for instance, sodium chlorate. It, however, has recently attracted some attention in France as a remedy in cancer of the stomach; it is stated to be less toxic

than potassium chlorate. The book, however, is especially valuable for reference.

KOLA NUT, a working bulletin reprinted from the *Pharmacology of the Newer Materia Medica*. By Parke, Davis & Co.

It is of interest to observe the recent revival in the use of this product; for, though first mentioned in this country in 1865, in the AMERICAN JOURNAL OF PHARMACY, and later in medical journals, it failed to excite any special interest.

We hope that kola will receive the investigation its merits seem to demand. At present it is largely on trial as a therapeutical agent, and any extravagant claims made in its behalf by interested manufacturers should be taken *cum grano salis*. J. W. E.

ERDMANN-KÖNIG'S GRUNDRISS DER ALLGEMEINEN WAARENKUNDE, UNTER BERÜCKSICHTIGUNG DER TECHNOLOGIE. 12te Auflage, von Prof. Edward Hanausek. Leipzig, 1895. Large 8vo. Pp. 570.

This is a new and revised edition by Prof. Hanausek, of the Vienna School of Commerce, of the well-known work founded by Otto Linné Erdmann. It has long been a standard work, for commercial and technical schools, on the raw materials of commerce and the manufacturing arts. The ground covered is necessarily very extensive, embracing both inorganic and organic materials, and including the substances used in a wide range of the arts. Nevertheless, most valuable information is given, the microscopic structure of fibres, cereals and fruits being given, as well as the methods of preparing the raw materials for their technical applications.

The illustrations are numerous and in general of excellent quality, especially the many microscopical sections of plant and animal tissues. While the book is much more general in its character than "Berg's Pharmaceutische Waarenkunde," as now edited by Dr. Garcke, it possesses much of interest for the well-informed pharmacist or chemist.

The extensive bibliography of special and general works on the subjects covered in the work is also a valuable feature, as it points out to the student the sources of additional and more detailed information on many points.

S. P. S.

ZUR KENNTNISS IN DER ECHTEN COTORINDE ENTHALTENEN KRYSTALLISIRBAREN STOFFE. Von O. Hesse. Reprint from *Liebig's Annalen*, 282, 191. Revised by the author.

BERICHT ÜBER DIE DREIZEHENTE VERSAMMLUNG DER FREIEN VEREINIGUNG BAYERISCHER VERTRETER "DER ANGEWANDTEN CHEMIE" in Aschaffenburg am 5. und 6. August 1894. Munich, 1894.

THE CHEMISTS' AND DRUGGISTS' DIARY FOR 1895. Received from the *Chemist and Druggist* of London.

In addition to containing space in which to write memoranda, or the events of each day in the year, this volume contains much compact valuable information about such subjects as Laws Affecting Chemists and Druggists, Postal and Telegraphic Information, the Sale of Spirits and Wines, Water Analysis, etc. It is likewise a marvel in the line of advertising, as it shows what one can do in that direction in the great city of London.

PROCEEDINGS OF THE ELEVENTH ANNUAL CONVENTION OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS. Edited by Harvey W. Wiley. U. S. Department of Agriculture, Division of Chemistry, Washington, 1894.

The most interesting report in this number to pharmacists, is that on Tannin by Mr. W. H. Krug, in which an attempt is made to present a method that will be uniformly adopted by all chemists in this country.

A COMPILATION OF THE PHARMACY AND DRUG LAWS OF THE SEVERAL STATES AND TERRITORIES. By A. J. Wedderburn. U. S. Department of Agriculture, Division of Chemistry, Washington, 1894.

This pamphlet of 152 pages is of especial interest to pharmacists, since in it will be found the answers to many questions that are constantly being asked about pharmacy laws. We learn in the Letter of Submittal that the following States and Territories are without laws regulating the practice of pharmacy: Idaho, Indiana, Montana, Nevada, Arizona and the Indian Territory. The Maryland law relates only to the city of Baltimore.

REPORT ON THE EXTENT AND CHARACTER OF FOOD AND DRUG ADULTERATION. By A. J. Wedderburn. U. S. Department of Agriculture, Division of Chemistry, Washington, 1894.

CONSULAR REPORTS. Volume 46, Nos. 171 and 172

The most interesting contribution in No. 171 to pharmacists is the one on Kola Nut, which was printed in the January number of this JOURNAL.

A CONTRIBUTION TO THE KNOWLEDGE OF BACTERIOLOGICAL CHEMISTRY. By W. T. Wenzell, M.D. Reprinted from the Journal of the American Medical Association, December 15, 1894. This interesting paper was read before the Section on Materia Medica and Pharmacy, at the Forty-fifth Annual Meeting of the American Medical Association, held at San Francisco, June 5-8, 1894.

THE MEDICAL, PHARMACEUTICAL AND DENTAL REGISTER-DIRECTORY AND INTELLIGENCER. With special Medical, Pharmaceutical and Dental Departments, containing detailed information of Colleges, Hospitals, Asylums, Medical Societies, etc., for Pennsylvania, New Jersey, Maryland, Delaware and the District of Columbia. Third edition. George Keil, Publisher and Editor. Philadelphia, 1895.

REPORT OF COMMITTEE OF PHILADELPHIA COLLEGE OF PHARMACY ON ALCOHOL LEGISLATION.

To the Philadelphia College of Pharmacy:

Your Committee on Alcohol Legislation, appointed at the Pharmaceutical meeting, held on October 16, 1894, would report that the subject has received careful consideration, and that they have endeavored to discharge the duty imposed upon them by the resolutions and instructions then adopted.

A circular letter, a copy of which is here appended,¹ was issued to the pharmacists, and in addition to the circulation by mail to those engaged in the busi-

¹ This was printed on page 601, Vol. 66, of this JOURNAL.

ness in Pennsylvania, New Jersey and Delaware, a much larger number have been reached through pharmaceutical journals that have generously reprinted the letter.

The replies received and the correspondence resulting therefrom, prove beyond any doubt that the retail pharmacists are, almost universally, in favor of the abolition of all tax on alcohol used in the arts or medicine. Correspondence with a number of officers of State Pharmaceutical Associations indicated that they are likewise, enthusiastically in favor of the same.

The information gleaned from these replies fully confirmed the statements made in the circular letter issued by the Committee, and we emphatically reaffirm:

That alcohol is indispensable to the manufacture of medicinal products and in many processes in the arts.

That in the medicinal preparations in which it enters, it becomes as much a medicine as the contained drugs or chemicals.

That the present tax of \$1.10 per proof gallon is oppressive, and opposed to the best interests of both manufacturer and consumer.

That this tax requires the manufacturer to greatly increase the amount of capital invested, and on a large percentage of such increase no profit is derived.

That this tax is a barrier to the healthy development of pharmacy and to the advance of the manufacturing industries in which alcohol is necessarily used.

That it prevents the retail pharmacists from preparing a large number of the preparations which he dispenses, and the purity of which he should be able to vouch for, in order to conscientiously discharge his duties to the community.

That the enhancement in the value of medicines, caused by this excessive tax is really a hardship to many sick and poor. Your Committee cannot believe that any urgency of the treasury would warraht Congress in continuing this barbarity, nor that the sentiment of the country would uphold a tax on the medicines needed by the sick and infirm.

A concise review of the history of the alcohol tax may not be inappropriate. When the demands on the Treasury, in 1862, compelled the introduction of an Internal Revenue system of taxation, a tax of 20 cents per proof gallon was placed on distilled spirits. This was continued until 1864, when the need of greatly increased revenue, compelled the Government to change the tax on distilled spirits three times within that year; first to 60 cents per proof gallon and then to \$1.50 and finally to \$2.00. This was recognized, at the time, as an extreme measure necessitated by the war, and the increase in fraud following each increase in the tax was notorious. The price of alcohol in 1861, 46 cents per gallon, was by this means increased, until, in 1865, it was \$4.96.

The manufacturers and pharmacists at that time fully realized that this was a burden borne only partly by the consumers, as with each advance in the cost of their products they were enabled to charge only a portion of that advance.

In 1868, in response to numerous petitions for relief from this burdensome tax, and in accordance with the recommendations of the commissioner of Revenue, "that a rate of 50 cents per proof gallon was ample," Congress fixed the rate at that figure.

In 1872 this was advanced to 70 cents, and in 1875 again changed to 90 cents, and despite the appeals of the manufacturers for relief from this unjust burden, the tariff act of 1894 now advances the tax to \$1.10 per proof gallon. On every

gallon of 94 per cent alcohol the Government now collects \$2.07 tax. In other words, *tax is six times* that of the intrinsic value of the article at the present time.

This committee would especially direct attention to the fact, that, with the exception of a few isolated articles, *this recent increase in the burden of taxation, amounting to 38 cents per gallon on alcohol, has been entirely borne by the retail pharmacists.* The manufacturers and wholesale dealers have advanced the price of most products from 4 to 8 cents per pint, yet the retailer has been unable to distribute this advance on his sales in small amount and obtains for his goods no more than he did prior to this change in tax.

Since 1862 manufacturers have claimed that it was a very unwise and unjust policy of the Government to single out a large, very respectable and honorable class of manufacturers, engaged in most instances, in preparing products necessary for the welfare and prosperity of the nation, to bear unusual and burdensome taxation.

Alcohol is to the druggist a raw material, and is as indispensable to the manufacturer of pharmaceutical and chemical products as iron is to the manufacturer of steel. Alcohol is, to this class of manufacturers, as essential as cotton, iron, silk and fuel are to other industries.

Steel is the basis for many manufactures, yet the Government would not think of taxing these manufacturers so much per ton on the iron consumed, because certain manufacturers make therefrom fire-arms, with which evil-disposed persons might commit assault, murder or suicide. Why, then, should such manufacturers as pharmacists and chemists, who use alcohol only in their legitimate operations, be subjected to this enormous tax on their materials? Are we not engaged in an honorable and necessary calling and as much deserving of encouragement by the Government as others? We certainly should not be discriminated against unfairly by tax-laws.

While admitting that the alcohol consumed as a beverage may be a legitimate article of taxation, this attempt to tax people into temperance, after a trial of more than thirty years, has proven to be a signal failure. While there may be moral reasons for retaining this tax on beverages, neither morality nor revenue necessity should compel this enlightened nation to assume a position, of which a writer says: "The nation is robbing the sick far greater than the drunkard."

Several acts, aiming to grant to manufacturers the relief from the alcohol tax, have, at different times, been proposed to Congress, but, until the enactment of the present customs law, failed of passage. Notable was the act offered in the Senate in 1888, which provided for the use, by manufacturers, of alcohol on which the tax *had not been paid.* This provision necessitated every manufacturer establishing a bonded warehouse on his plant, from which the alcohol could be drawn only under the supervision of a revenue inspector. All such alcohol could only be received under the regulations covering the withdrawal of spirits from one bonded warehouse to another. The expense attached to such a plan would prohibit any but the larger manufacturers from adopting it, and it is questionable if the manufacturers of America would submit to the mortification of conducting their operations under the surveillance of an official inspector. This proposed Act of 1888 appears still to be lingering in the minds of some of those who are discussing the subject at the present time.

Your committee are not ready to admit that by the increase of tax on alcohol

in 1894, Congress intended to place an additional burden of taxation on manufacturers who necessarily use that article in their operations. The very fact, that section 61 was incorporated in the same act is an admission and a positive proof that the legislative branch of the government recognized as a distinct matter of principle that alcohol for legitimate manufacturing purposes, should be exempt from all taxation. It is admitted that the evident intention of this act was to grant that relief which had so long been prayed for by druggists and other manufacturers. It behooves us to cling *tenaciously* to this legislative concession and not permit the Government to recede from its admitted inclination to correct a long standing injustice.

Section 61 of the Customs Law of 1894, reads as follows :

"Any manufacturer finding it necessary to use alcohol in the arts, or in any medicinal or other like compound, may use the same under regulations to be prescribed by the Secretary of the Treasury, and on satisfying the Collector of Internal Revenue for the district, wherein he resides or carries on business, that he has complied with such regulations and has used such alcohol therein, and exhibiting and delivering up the stamps which show that a tax has been paid thereon shall be entitled to receive from the Treasury of the United States a rebate or re-payment of the tax so paid."

A careful study of this act convinces us that, although in some respects somewhat indefinite, it is a more simple, much wiser and more equitable provision than any of the previously proposed acts.

As many of the newspapers and pharmaceutical journals have commented upon this act and placed constructions upon its wording which your committee deems unwarranted, we would offer a few comments on its provisions.

The introducing words "*any manufacturer*" show that it was not intended to limit the operating of this act to only the *larger* manufacturers. The use of alcohol in large quantities was not the requisite. The act was to be general; to include all manufacturers whose products were used in the arts or medicine.

The words "*medicinal compound*" indicate that the intent was to include all products used in medicine in which alcohol is necessarily a component part, and as such, really a medicine itself, and not only products in which the alcohol has by chemical process undergone change so as to entirely destroy its identity. This narrow construction would limit the use of tax-free alcohol to only a few manufacturers of chloroform, ether, etc. It is even doubtful, if such chemical products could, with the correct meaning of the phrase, be classed with "*medicinal compounds*."

Your committee would submit, that whatever regulations are prescribed by the Secretary of the Treasury or enacted by Congress for carrying this law into effect, they should be in harmony with the evident intent of the law. They should be simple and general and not discriminate in favor of only a few manufacturers. In this respect, it has been generally assumed by the public press that those manufacturers who obtained the benefit of this act would be compelled to establish a bonded warehouse and be subjected to the accompanying expense and espionage, and they assume, erroneously, that manufacturers would be permitted to withdraw alcohol from bond *without payment of the tax*. It is rather surprising that a writer, usually so well informed, as the Washington correspondent of the Philadelphia *Public Ledger*, should as late as January 1, 1895, state that "the Tariff Act authorizes the *withdrawal of alcohol without*

payment of tax when intended for use in the arts." * * * "The Secretary of the Treasury is required before putting the law into operation to formulate regulations for the protection of the revenue against improper *withdrawals*."

It must be remembered that this act *does not* contemplate the establishment of bonded warehouses, and that when such a plan was proposed by a wholesale druggist coupled with the offer that each manufacturer should bear the expense of government inspection, the Secretary of the Treasury stated at once that a statute positively forbade the government accepting any financial aid in the discharge of the treasury regulations.

Any regulation looking toward the establishment of bonded warehouses by manufacturers must be strenuously opposed by pharmacists, as they would be deprived of any benefit, and such a provision would monopolize all chemical and pharmaceutical manufacture to the few who could afford the expense. The act does *not provide* that alcohol should be taken out of bond and used without the payment of tax, but does provide that only alcohol on which the *tax has been paid* can be used, and that *after such alcohol has been used* and the cancelled stamps delivered up, shall the manufacturer be entitled to receive from the treasury of the United States a rebate of the tax paid. The alcohol *must be used and not intended for use*, as the Government will not accept the intent.

This is at once a wise provision and a most excellent safeguard against fraud on the Treasury. The Government collects all the tax, and only when the "collector of the district is satisfied" that the alcohol has been used for legitimate manufacture within the intent and spirit of the act, shall the user receive repayment of the tax.

It was apparent to your committee, from the first, that the great obstacle in the way of enforcing this law is the difficulty of framing regulations by the Treasury Department that would be satisfactory to the various interests concerned, and that would be effective in protecting the Government from fraud. To this problem we have given careful deliberation. After some progress had been made in the consideration of the various ideas presented as a basis for some suggestions as to how this might be accomplished, your committee learned that committees of the Philadelphia Drug Exchange, and of the National Wholesale Druggists' Association were similarly engaged.

It was suggested that the work of these several committees would be more effective if they could agree upon suggestions or a plan which would be acceptable and secure the support and concerted and harmonious action of the various interests represented by these three bodies. A conference of representatives of these committees was arranged, and it was seen that a united action was perfectly feasible.

In this conference and in the subsequent deliberations of the joint committees, your committee have assumed the position of representing the interests of the retail pharmacists, and have insisted that the suggestions framed must be such as would permit this numerous class sharing in the benefits of the act.

A copy of the suggestions as now agreed upon is submitted herewith for your consideration. Should they merit the approval of the three bodies represented, copies will be transmitted to the Secretary of the Treasury and mem-

bers of Congress with the request that they form a basis of regulations or further Congressional action to render the law operative.

GEORGE M. BERINGER,

Chairman.

ROBERT ENGLAND,

WILLIAM MCINTYRE,

RUSH P. MARSHALL,

JOSEPH W. ENGLAND,

Secretary.

SUGGESTIONS OFFERED BY THE COMMITTEE ON LEGISLATION OF THE NATIONAL WHOLESALE DRUGGISTS' ASSOCIATION: THE COMMITTEE ON LEGISLATION OF THE PHILADELPHIA DRUG EXCHANGE; AND THE COMMITTEE ON ALCOHOL LEGISLATION OF THE PHILADELPHIA COLLEGE OF PHARMACY, AS A BASIS FOR FRAMING A LAW, OR MAKING REGULATIONS TOWARDS DEFINING AND RENDERING OPERATIVE SECTION 61 OF THE CUSTOMS LAW OF 1894.

DEFINING "MANUFACTURER."

That the term "*manufacturer*" as used in Section 61 of the above-mentioned act, and in these suggestions, shall be construed as meaning and including all those who purchase alcohol in *original packages*, as hereinafter defined, for the purpose of manufacturing products used in the arts or medicine, and who do not use the alcohol in the preparation of compounds that can be classed as beverages.

DEFINING ALCOHOL FOR MANUFACTURING PURPOSES.

That no spirit of less strength than eighty (80) per cent. above proof, or ninety (90) per cent. by volume, shall be classed by the Internal Revenue Office as *Alcohol for Manufacturing Purposes* within the meaning of the act.

DEFINING ORIGINAL PACKAGES AND REGULATING THE STORAGE OF ALCOHOL.

All alcohol used in the arts or in the manufacture of medicinal compounds on which a claim for rebate of the tax is to be made, must be purchased in packages, as put up by registered distillers, of not less than one-half barrel, and containing not less than twenty (20) wine gallons each. Such packages shall be considered as "*original packages*" within the meaning of the act. All such alcohol must be stored by the manufacturer, immediately on receiving the same, in an apartment separate from that in which alcoholic liquids of any kind are offered for sale, and each package must be marked distinctly "*For Manufacturing Purposes Only.*"

That every manufacturer desiring to secure the benefit of the act, shall file with the Collector of Internal Revenue for the district in which the said manufacturing industry is located, a notice of such intention, accompanied by a statement of the location of the factory or apartment, and the character of the products in which the alcohol is to be used. For the faithful observance of the conditions of the law he shall give bonds, to be renewed annually, to an amount proportionate to the quantity of alcohol likely to be used.

That an accurate account be kept of all alcohol purchased for manufacturing purposes, and of the class of products in which it was used.

At the time stamps are surrendered and a claim made for payment of the rebate of the tax on alcohol used for manufacturing purposes, there shall be presented by the claimant a sworn statement setting forth the class of articles in the manufacture of which such alcohol was used.

No such claim to be allowed until it is certified to as correct by the Internal Revenue officer deputized for this purpose.

To protect the Revenue against fraud by the manufacture of any compound that, under the guise of medicine, could be popularly sold as a beverage, the Commissioner of Internal Revenue shall refer a sample of the preparation to an expert connected with his office for analysis, should he doubt the character of the product on which the manufacturer claims the rebate of tax on alcohol. Upon the report of this expert the Commissioner shall base his decision as to whether the manufacturer is entitled to the rebate. From this decision an appeal can be taken as hereinafter provided for.

From the Commissioner's decision there shall be a right of appeal to a Board to be selected by the Secretary of the Treasury, from names submitted by the presidents of such associations as:

The American Pharmaceutical Association.

The American Medical Association.

The American Chemical Society.

The National Wholesale Druggists' Association.

The National Paint, Oil and Varnish Association.

Each president presenting the names of three persons, but not more than one to be selected from each Association. The Board here provided for shall meet at stated intervals in Washington, at the office of the Commissioner of Internal Revenue, to consider the appealed cases as above provided for. Protection to the Revenue against the danger of illicitly reclaiming alcohol, selling the alcohol represented as having been used for manufactures, or other evasions of the law, to be afforded by the methods now at the command of the Internal Revenue Office for the detection of frauds.

COMMITTEE ON LEGISLATION OF THE NATIONAL WHOLESALE DRUGGISTS' ASSOCIATION.

Edward H. Hance, Chairman, Philadelphia.

Horace M. Sharp, Philadelphia.

Horace Burrough, Baltimore.

B. F. Fairchild, New York City.

Albert Plaut, New York City.

Hugh H. Osgood, Norwich, Conn.

Arthur W. Clafin, Providence, R. I.

John A. Gilman, Boston.

Charles Cook, Portland, Me.

Wm. A. Robinson, Louisville, Ky.

Dr. R. V. Pierce, Buffalo, N. Y.

L. A. Lange, Chicago.

C. H. West, St. Louis.

Frank A. Faxon, Kansas City, Mo.

J. C. Fox, Atchison, Kan.

John B. Purcell, Richmond, Va.

Evan F. Lilly, Indianapolis, Ind.

P. P. Van Vleet, Memphis, Tenn.

Edw. H. Cutler, St. Paul, Minn.

A. R. Olney, Clinton, Ia.

Wm. P. Reddington, San Francisco.

COMMITTEE OF THE PHILADELPHIA DRUG EXCHANGE.

Edward H. Hance.

H. N. Rittenhouse.

H. B. Rosengarten.

COMMITTEE ON ALCOHOL LEGISLATION OF THE PHILADELPHIA COLLEGE OF
PHARMACY.

George M. Beringer.

Rush P. Marshall.

William McIntyre.

Joseph W. England.

Robert England.

MINUTES OF A SPECIAL MEETING OF THE
PHILADELPHIA COLLEGE OF PHARMACY.

PHILADELPHIA, January 23, 1895.

A special meeting of the Philadelphia College of Pharmacy was held this day. On motion of Robert England, Prof. Jos. P. Remington was called to preside, and T. S. Wiegand was asked to act as Secretary.

The chairman stated that the object of the meeting was to consider the report of the Committee on Alcohol Legislation.

The report of the Committee on Alcohol Legislation was read by the chairman of the Committee, Mr. Geo. M. Beringer, and suggestions for a plan to carry out the provisions of the law relative thereto. (See Report and Suggestions on preceding pages).

The chairman stated that the subject was open for discussion.

Mr. Procter, asking for information, wanted to know what a druggist should do about selling alcohol for burning purposes.

Mr. Beringer replied that the law did not contemplate the sale of alcohol by druggists and others who should get it tax-free for manufacturing purposes. Other alcohol, on which tax had been paid, would have to be sold for household purposes.

Mr. Redsecker, in further explanation, thought that those who contemplate using it for burning, varnishes, etc., must purchase it in original packages if their uses warranted getting that amount. He thought the suggestions of the Committee a fair presentation of the case.

Prof. Remington said there could be no question about the desirability of the Philadelphia College of Pharmacy taking an active part in trying to procure tax-free alcohol for the pharmacist. But the great question was not one of excluding the retail druggist, but of preventing fraud. The loss of \$20,000,000 revenue to the Government was not for us to consider. It was not the duty of the College to point out how the Government revenue is to be maintained.

Mr. Ross said that Government inspectors are required at the present time to detect fraud, and decide between a beverage and a medicine, and they could do the same if the present law were enforced.

Prof. Remington said he thought that the Committee had done very good work, and offered the most practical set of suggestions of any he had seen.

It was announced that these resolutions had been endorsed by the directors of the Drug Exchange, and since then approved by the Drug Exchange itself;

they also received the approval of the executive committee of the National Wholesale Druggists' Association.

It was the opinion of the meeting that the Committee had shown their ability and zeal by their report, and that the suggestions made by them were the most valuable of any yet submitted to the Secretary of the Treasury for the purpose of carrying out the law.

On motion it was resolved and adopted that the Philadelphia College of Pharmacy approve of the report and suggestions thereto appended.

That the report be printed in the AMERICAN JOURNAL OF PHARMACY and the ALUMNI REPORT, and that an abstract of the report be given to the daily papers.

There being no further business, an adjournment was ordered.

THOS. S. WIEGAND,
Secretary pro tem.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, January 15, 1895.

Frank G. Ryan, Ph.G., was asked to preside.

The Registrar reported the donation of a volume of the Memoir and Science Papers of the late Daniel Hanbury, presented by Dr. E. R. Squibb on behalf of Mr. Hanbury's brother. It was accepted with thanks. A paper upon the *Cultivation of Licorice Root in the United States*, by H. N. Rittenhouse, Ph.G., was read by Professor Trimble. Almost all the licorice root of commerce is of wild growth; a five-acre field is the largest patch of cultivated root the writer had ever seen. Five-eighths of the entire supply is derived from Southern Russia.

Mr. Procter stated that his father, the late Professor Procter, had grown it at Mt. Holly, N. J.

Mr. F. W. Haussmann read some *Pharmaceutical Notes*, the first one being on the contamination of glycerin by iron. As most of the glycerin used in pharmacy is put up in tin containers of about 50 pounds each, it was thought this was the most common cause of the trouble. Mr. Beringer stated that large quantities of the glycerin now sold is of foreign make, and is brought to this country in large iron tanks, from which it is put up in the various containers.

This is one of the troubles found in preparing glycerite of tannin, elixirs and salicylates.

Variations in the appearance or taste of vinegar of squill have been noticed, by careful examination; these have been traced to the use of the red variety of squill, which gives a much darker preparation, very much more bitter than that made from the white squill.

Ultramarine in sugar has been frequently noticed by pharmacists; the objectionable odor which is so frequently noticed occurs particularly after the addition of both organic and inorganic acids. Mr. Beringer suggested that some of the contaminating sulphides are derived from the boneblack which contains both iron and calcium sulphides, which very naturally will be dissolved in the syrup and set free by the action of acids when added to such syrups.

Iodides of Tin was the subject of a paper by Mr. Chas. Bullock, and read by Mr. Beringer. It has been recommended for use in pulmonary affections, those

who have brought it forward have not stated whether the stannous or stannic iodide was the one found to be useful.

Mr. Joseph W. England exhibited a sample vial of antitoxin serum used in diphtheritic diseases. This differs from the Koch lymph method, as that inoculates with diseased virus, while this supplies an antagonistic principle which renders the patient immune to the diphtheria poison. The cost per vial is \$2.50.

On motion the papers were referred to the Committee on Publications.

A discussion was held upon tax-free alcohol, and an outline of the course of action by the committee was given by Mr. Beringer. The great difficulty attendant upon the adoption of a plan to supply tax-free alcohol arises from the needs of the Government for money, and also the difficulty of ascertaining the cost and best methods of regulating its sale for medicinal uses without endangering the loss of revenue from that used for the purposes of beverages.

On motion, adjourned.

T. S. WIEGAND.

OBITUARY.

Richard Clement Geist, Ph.G., Class 1889, died on Wednesday, August 29, 1894, of typhoid fever, at his residence, Medford, N. J., aged 26 years.

He was born at Medford, N. J., November 28, 1867, and received his education in the public schools of his native place. He entered the employ of Henry P. Thorn, Ph.G., Medford, N. J., to learn the drug business, April 8, 1885, and remained with him up to the time of his death.

He attended the Philadelphia College of Pharmacy and graduated with the class of 1889. He was a careful and competent pharmacist and strictly honest in his deportment to both his employer and to the customers, and was greatly respected by the entire community. He also enjoyed the respect and confidence of the medical profession of his neighborhood.

He was married, August 23, 1893, to Miss Rebecca W. Woolman, of Crosswicks, N. J., who, with his parents and a large circle of friends, mourned his early death.

His funeral was largely attended, all the business places of Medford being closed during the services, which were held the following Monday, September 3, 1894.

He was a member of the Alumni Association.

W. E. K.

Dr. Chas. P. Stout, Ph.G., Class of 1880, died at his late residence, No. 830 North Fifth Street, on Wednesday, August 22d, 1894, aged 36 years. He was born at Florence Heights, N. J., and received his early education at his native place.

He came to Philadelphia January 1, 1878, and entered the employ of Leidy Seiple, at the corner of Fourth and Poplar Streets, where he learned the drug business. He attended the Philadelphia College of Pharmacy and graduated in the class of 1880. Afterward he attended the University of Pennsylvania and graduated as a physician in 1884, and immediately located on Fifth Street near Poplar, where he continued in the practice of medicine up to the time of his death. He was a member of the Alumni Association. His remains were interred in Cedar Hill Cemetery, at Florence Heights, N. J., on Saturday, August 25, 1894.

W. E. K.

THE AMERICAN JOURNAL OF PHARMACY

MARCH, 1895.



STRUCTURE OF CIMICIFUGA.

BY EDSON S. BASTIN.

Cimicifuga racemosa, *Nuttall*, the source of the drug, is a native of the eastern portion of Canada and of the United States, extending as far south as Florida. It is a large, perennial, smooth herb, whose wand-like stem often attains a height of seven or eight feet, is leafy only near its middle, where it bears several large petiolate, triternate leaves, the leaflets of which are ovate or ovate oblong, acute and deeply serrate-toothed. The white flowers are borne in long, terminal, erect racemes which attain a length of from eight inches to three feet; the four or five small sepals fall when the flower opens; the petals, from one to eight in number, are small, clawed and two-horned at the apex; the stamens are indefinite in number, and constitute the most conspicuous part of the flower when fully expanded; the pistil is usually single, but sometimes there are two or three. The pods are oblong, dehiscent and many-seeded.

The thick, knotty rhizome, with its numerous rootlets, constitutes the official drug. The rhizomes have a horizontal growth and often attain a length of four or five inches, and the rhizome proper may attain an inch or more in thickness. On its upper surface are numerous stout, erect or somewhat curved branches which are terminated by cup-shaped scars, each of which usually show a distinct radial structure. The sides of the rhizome are more or less distinctly annulate with the scars of scales, and from the sides and lower surface, chiefly from the nodes, issue numerous rootlets. These, at their base, range from one-twelfth to as much as one-fourth of an inch in diameter and from six to ten inches long. In

the dried form, as the drug occurs in the market, the roots are much broken, the rhizomes are blackish-brown, hard and break with a smooth or a somewhat fibrous fracture. The color internally is

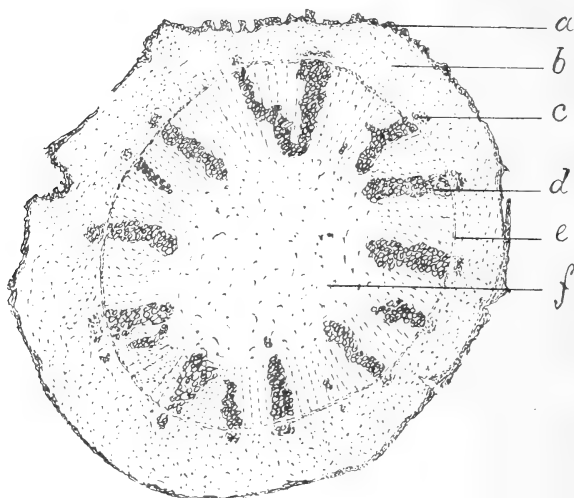


FIG. 1.

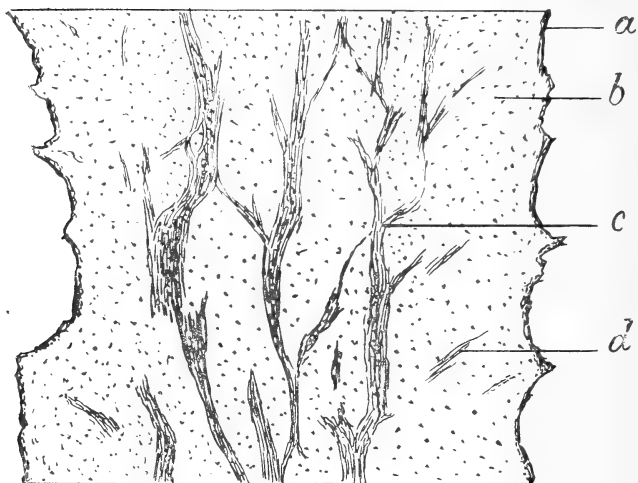


FIG. 2.

much lighter, being brownish or whitish. The roots are longitudinally wrinkled, brittle, and in cross-section appear obtusely triangular, pentangular or most commonly quadrangular, the number of angles depending upon the number of rays in the medullium.

The drug in the dried form has a slight but heavy odor, and a bitter and acrid taste.

The cross-section of the rhizome or of its branches, when stained by aid of phloroglucin and hydrochloric acid to reveal distinctly the wood wedges, shows that the latter are rather short, irregular in size and placed at unequal distances apart around a large central

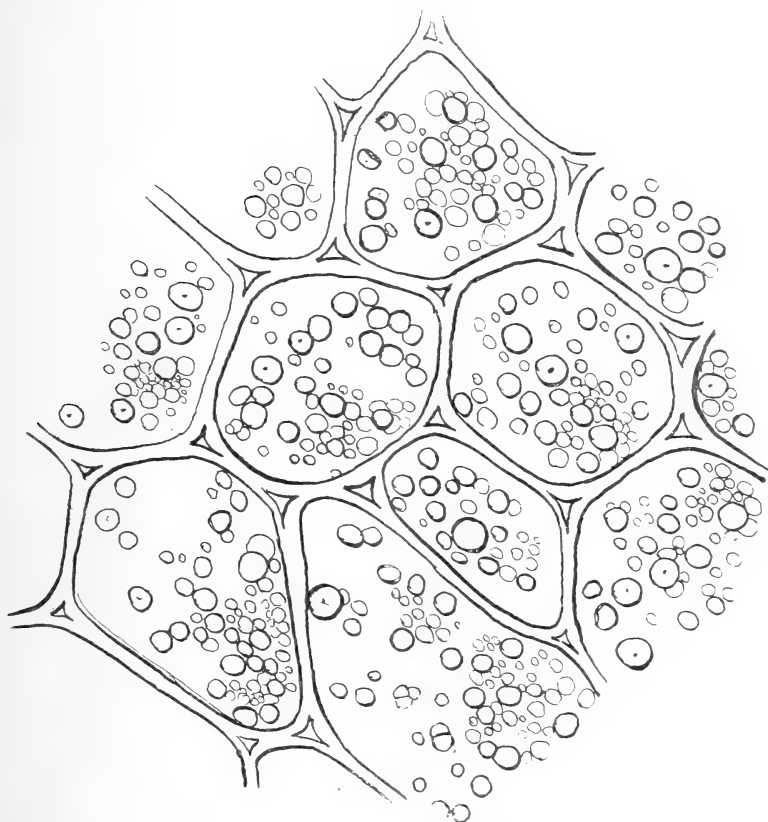


FIG. 3.

pith. The vascular bundles are usually considerably narrower than the medullary rays which separate them, and the bark is rather thick. These facts are shown in *Fig. 1*.

A longitudinal section stained in the same way shows the bundles to be also irregular in their course, and that adjacent bundles frequently send out anastomosing branches, as indicated in *Fig. 2*.

The parenchyma both of the rhizome and roots contain, if the drug is gathered in autumn, as should be the case, a considerable quantity of rather fine-grained starch, as shown in *Figs. 3 and 4*. The starch grains are more commonly simple and rounded, or somewhat angular, with a central or subcentral not usually conspicuous hilum, and only rarely showing concentric markings. Many of the grains, however, are compound, in twos, threes, or occasionally even in masses composed of several grains, very rarely as many as nine or ten.

The roots afford an interesting microscopical study and reveal a structure which is quite characteristic. If a section be made a little



FIG. 4.

way back of a root-tip, another near its middle and a third near its base, the primary structure of the central bundle and the secondary changes it undergoes may be easily traced. The primary bundle is usually tetrarch or possesses four xylem rays, but is sometimes triarch or pentarch. *Fig. 5* shows a tetrarch bundle from a young portion of a root in which the bundle is but little altered by secondary changes. A wavy zone of cambium has only just been formed between the phloem masses and over the ends of the xylem rays.

In *Fig. 6* the secondary changes have progressed much farther, the whole bundle is much increased in size by growth in the endodermis, in the pericambium and particularly in the cambium zone. The inner ends of the xylem rays have grown by the formation of

new ducts until the bases of some of the adjacent rays appear to coalesce. The phloem masses have also increased considerably in size by new growths on their inner face. Finally, in *Fig. 7*, a section of the old or mature portion of the bundle is shown. In this the bundle is observed to be enormously increased in size, and most conspicuous among the structural changes observed are the forma-

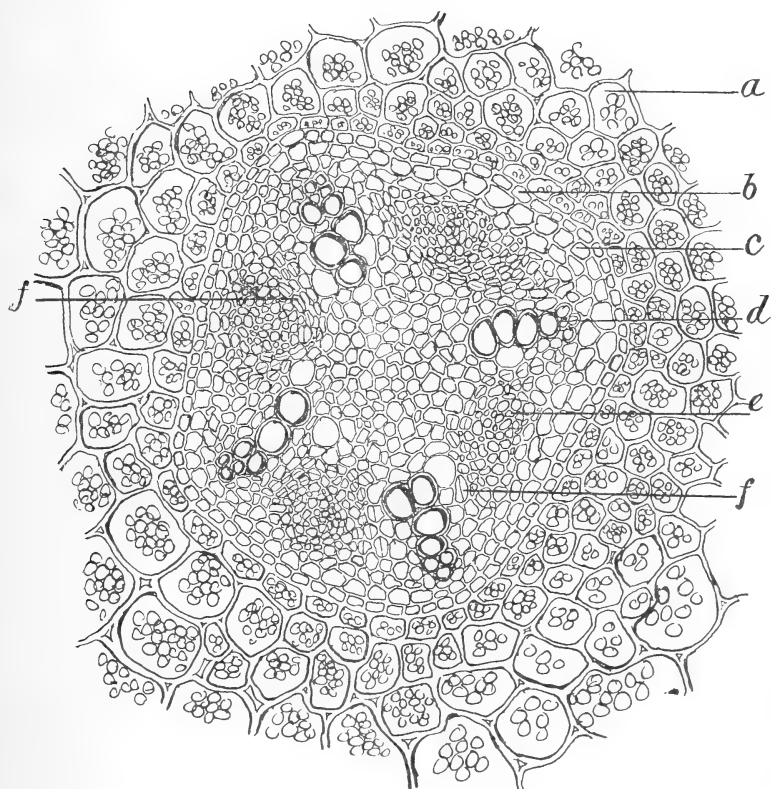


FIG. 5.

tion between each pair of primary xylem rays and back of each phloem mass a large xylem wedge, so that the xylem elements in their arrangement now present the form of a Maltese cross. Alternating with the arms of this cross are four broadly-wedge-shaped medullary rays (also secondary formations), the thin inner end of each wedge resting upon one of the original xylem rays, as shown at *f* in the figure.

In this species it will be seen that the number of secondary xylem wedges and of medullary rays corresponds to the number of xylem rays and of phloem masses in the primary radial bundle.

The root thus affords us the best characters for the identification of the drug. There are few roots in which the most characteristic

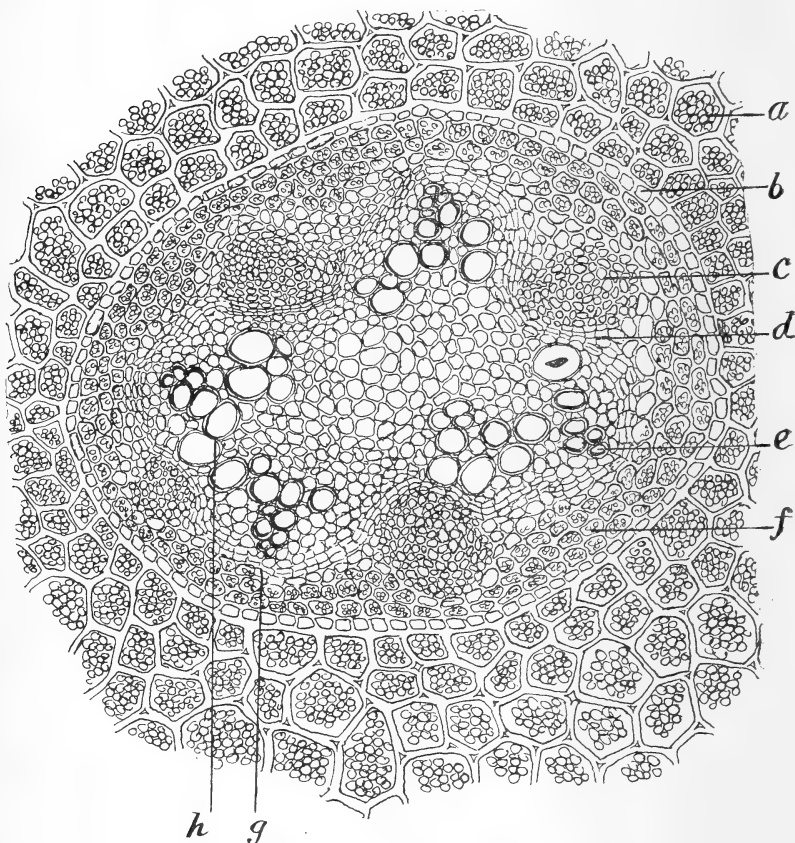


FIG. 6.

secondary changes that occur in the roots of dicotyls are traceable with so little difficulty as in this. It therefore affords an especially good example for the young microscopist to study.

It should be observed also that the number of rays is not always constant in the same root. It may, for example, be triarch at the apex and tetrarch near its base, or it may be tetrarch near its apex

and pentarch toward its base. In this respect, however, the roots of *cimicifuga* are not exceptional, many other dicotyls as well as many monocotyls showing similar variations in the number of rays.

DESCRIPTION OF FIGURES.

Fig. 1.—Diagram of cross-section of a small rhizome of *Cimicifuga*, magnified 6 diameters. *a*, cork; *b*, middle bark; *c*, phloem mass or bast; *d*, xylem of a bundle; *e*, cambium zone; *f*, pith.

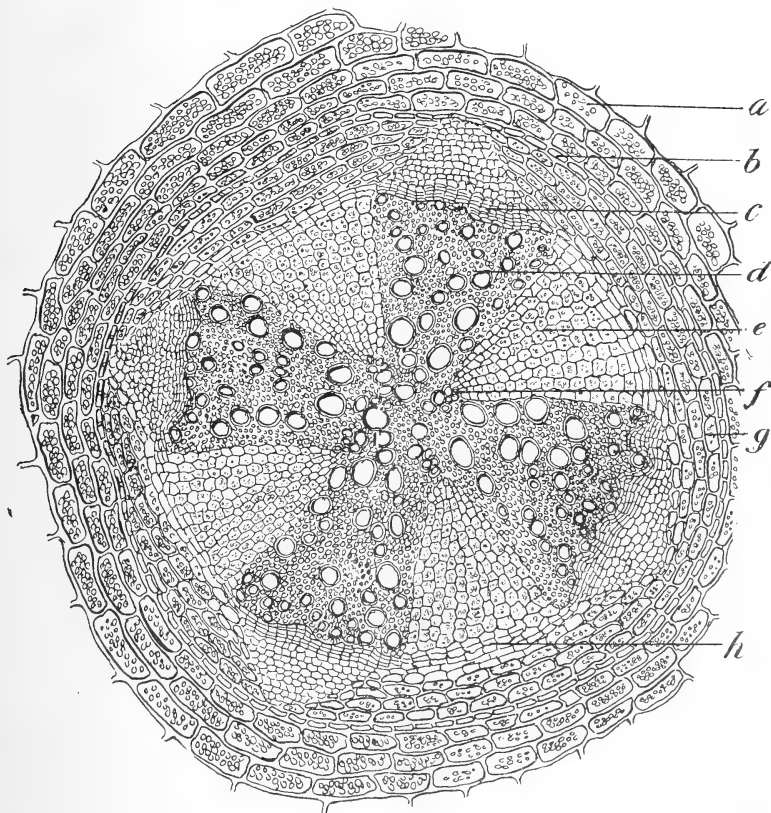


FIG. 7.

Fig. 2.—Diagram of a longitudinal tangential section of same rhizome, also magnified 6 diameters, showing anastomosing bundles. *a*, cork; *b*, middle bark; *c*, xylem of a bundle; *d*, small portion of bundle passing out to supply rootlet.

Fig. 3.—Small portion of cortical parenchyma, showing starch grains. Magnification, 495 diameters.

Fig. 4.—Starch of *Cimicifuga*. Magnified 1000 diameters.

Fig. 5.—Drawing showing tetrarch radial bundle of root of *Cimicifuga*, magnified 110 diameters. The section was from a young root, in which the medullium had undergone but little secondary change. *a*, a parenchyma cell from cortex; *b*, cell of endodermis; *c*, pericambium; *d*, outer end of xylem ray; *e*, phloem; *f, f*, meristem forming between xylem ray and phloem.

Fig. 6.—Section showing central part of an older root in which the secondary changes have made further progress. Magnification, 110 diameters. *a*, parenchyma cell of cortex; *b*, cell of endodermis; *c*, phloem; *d*, meristem now traceable as a cambium zone; *e*, outer extremity of xylem ray; *f*, starch-bearing cells formed beneath pericambium; *g*, cambium opposite outer end of xylem ray; *h*, new ducts in process of formation, the beginning of the secondary xylem.

Fig. 7.—Section of central part of a mature root in which the secondary changes have been completed. Magnification, about 60 diameters. *a*, parenchyma cell of cortex; *b*, cell of endodermis; *c*, cambium zone; *d*, duct in secondary xylem; *e*, broad, wedge-shaped, medullary ray; *f*, outer end of one of the original xylem rays at inner end of medullary ray; *h*, inter-fascicular cambium. *Figs. 5, 6 and 7* are from the author's Laboratory Exercises.

NOTES ON SOME SAPS AND SECRETIONS USED IN PHARMACY. —

BY P. L. SIMMONDS, F.L.S.

[Continued from p. 100.]

Butea frondosa, Roxb. This Indian tree—the Dhak or Pulas—yields a gum which is sold as Bengal kino. It occurs in the form of fragmentary pieces of a deep claret color, mixed with similarly-shaped particles of gray bark. The purer qualities are met with in round tears, often bright claret colored and free from dirt. It may be purified by solution in water. The brilliant ruby-red colored tears are translucent and very brittle, heat rendering them more so, instead of melting the gum. With age, it darkens, and becomes opaque. In native medicine, in India, it is largely used as an astringent.

Camphora officinarum, Nees. The aggregate exports of camphor from China have increased considerably of late years. They were 22,231 cwt. in 1892, and 40,763 cwt. in 1893. The island of Formosa yields the principal quantities, the yearly output being now as much as 41,650 cwt., shipped from the ports of Tamsui and Tainan. The exports from Japan range from 3,000,000 to 4,500,000 cattsen, = 35,714 cwt. to 53,571 cwt.

Malay or Borneo camphor is obtained from *Dryobalanops aromatica*. The imports of crude camphor into the United States seem on the decline, having been 2,857,222 lbs. in 1887, and but 1,733,425 lbs. in 1893.

Canarium commune, Lin. This tree yields the concrete resinous exudation, known as Manila Elemi. It has a fragrant, fennel-like odor, and is usually soft and unctuous to the touch. Its medicinal properties are analogous to those of turpentine, and it is for external use only. It is said, however, to have the same properties as copaiva.

C. edula, of Africa, exudes a similar resin.

C. strictum, Roxb. The black dammar tree, yields a brilliant resin, which is used medicinally in India as a substitute for Burgundy pitch.

Carica papaya, Lin. This tree has several valuable medicinal properties. The milky juice is among the best vermifuges known. The natives in India repeatedly use it for children. In the West Indies the powder of the seeds is used for the same purpose. The juice of the fruit is said to destroy freckles on the skin, caused by the sun's heat, and the negroes employ the leaves to wash linen, instead of soap. The fruit is pickled and preserved for curries. The milky, viscid juice of the fruit has a singular effect in rendering meat tender. It has this effect even if the meat is hung under the tree for two or three hours.

Cedrus Dedara, Loudon. This tall, handsome Indian tree yields a true resin, and, by destructive distillation, a dark-colored oil, resembling tar, which is used medicinally.

Cistus Creticus, Lin.

Labdanum, or *Ladanum*, is a viscous, resinous exudation from the above species, and also to some extent from *C. ladaniferus*, L., *C. Ledon*, Lam., *C. laurifolius*, L., and *C. monspiliensis*, Lin. It is black brown, soft, of pleasant smell and bitter taste, and was once in high repute in medicine as a stimulant and expectorant, and recommended in chronic catarrh; but at present is chiefly used in perfumery. About 50 cwt. are annually collected in Crete, and some quantity also in Cyprus, and sent to Constantinople. *Labdanum* was formerly regarded by the Turks as a preventive against the plague, and they wore pieces as amulets, or affixed to their walking-sticks. They chiefly use it now for fumigation.

Cochlospermum Gossypium, DeC. This tree and *Sterculia urens* yield a clear white gum, which can be employed as a substitute for tragacanth, and is exported to America. It is issued to the Government hospitals in Bombay instead of tragacanth, and is largely used in that city in the manufacture of sweetmeats.

Commia Cochinchinensis, Lour. This tree yields a white tenacious gum, of an emetic, purgative, deobstruent nature. If prudently administered, it is useful in obstinate dropsy and obstructions.

Copaifera Lansdorffii, Desf. This and some other species (*C. officinalis*, Lin., *C. Martii*, Hayne, *C. Guianensis*, Desf., and *C. coriacea*, Mart.) are believed to yield the medicinal oleo-resin. It is obtained chiefly from the Amazon district, by making incisions in the tree, and the sap flows so abundantly that as much as 12 pounds weight is collected in a few hours, and 42 quarts during the season. The source of copaiba is usually given as *C. multijuga*, but this is very questionable. In its medicinal action, copaiba is of great value as a diuretic and stimulant remedy in certain affections of the bladder and urethra; also in chronic bronchitis and other affections of the lungs and air passages, attended with excessive secretion. It has likewise been found serviceable in some chronic skin diseases, as leprosy and psoriasis. The imports into London are included with other balsams, therefore the quantity cannot be given. The imports into the United States, however, were, in 1888, 132,262 pounds; in 1889, 163,624 pounds, and in 1890, 206,240 pounds.

Dichopsis Gutta, Benthams; *Isonandra Percha*, Hooker; *Isonandra Gutta*, Lind.; *Palaquium Gutta*, Baillon and Burck. Gutta-percha, although chiefly employed for various economic purposes, has also a few medicinal and surgical applications. Sheets softened in water, when applied to injured limbs, harden and form good splints; dissolved in chloroform, it is applied as a dressing for wounds, and various surgical instruments are made of it. The imports into Great Britain in 1890 were 70,162 cwt., of the value of nearly £800,000, and in 1893, 40,497 cwt., valued at £303,593.

Dipterocarpus laevis, Ham.

The WOOD OIL known in all the Indian bazaars as "Gurgun," is obtained by tapping certain trees of this order, and applying heat to the incision. Several species yield the oil, which has all the medical properties of some of the more esteemed balsams, especially as a substitute for capaiva, in gonorrhœa and certain skin diseases.

D. incanus, Roxb., is reported to furnish the largest proportions of the best sort. The following is Roxburgh's account of the manner of obtaining this oil from *D. turbinatus*, Gaert.: "This tree is famous over all the eastern parts of India and the Malay Islands, on account of its yielding a thin, liquid balsam, commonly called 'wood oil,' which is much used in painting ships, houses, etc. To procure the balsam, a large notch is cut into the trunk of the tree, near the earth, and, say, about 30 inches from the ground, where a fire is kept up, until the wood is charred, soon after which the liquid begins to ooze out. A gutter is cut in the wood to conduct the liquid into a vessel placed to receive it. The average product of the best trees during the season is said to be sometimes 40 gallons. It is found necessary, every three or four weeks, to cut off the old charred surfaces, and burn them afresh; in large, healthy trees abounding in balsam, they even cut a second notch in some other part of the tree, and char it as the first. These operations are performed from November to February. Should any of the trees appear sickly the following season, one or more year's respite is given them."

This oleo-resin has been used in the cure of leprosy. Large quantities are exported from Burma to Europe, as it has become an important drug in trade. From the port of Hankow, in China, in 1893, 403,200 cwt. of this oil was exported.

Dorema ammoniacum, Don.

Diserneston gummiferum, Sp. and Jaub.

Peucedanum ammoniacum, Nees.

This fetid gum resin, having properties similar to asafœtida, comes in mass and in tears from Persia.

Lump ammoniacum resembles galbanum, while that in tears is somewhat like olibanum, but has a smooth surface outside, and an opaque fracture. It is used in medicine as an antispasmodic, stimulant and expectorant, in chronic catarrh, bronchial affections and asthma, and also for some plasters.

The imports into London are not large, and average about 100 packages, but fluctuate; in 1891, only 46 packages were received, but in 1892, 279 cases of 1½ cwt. each, and in 1893, 45 cases.

It is called "Uschekh" in Persia; in that country it is much used as an inward medicament, and also frequently for greasing the spinning wheels, as it is very cheap.

Dracæna species. The dragon's blood of Africa has been known in medicine from the earliest historical times. About 200 chests in mass or blocks come into London yearly. It is the resinous exudation of several different plants, is dark red-brown, and, when pulverized, carmine red, without taste or smell.

The African from Somali land is yielded by *D. Schizantha*, and that of Socotra by *D. Ombet*. The resin exudes, after the bark has been scraped, in about a fortnight. The Socotra kind is exported from Aden to Bombay.

Dragon's blood was formerly referred to *Dracæna Draco*, Lin., and *Calamus Draco*, Lin. The Sumatra dragon's blood appears in commerce in the form of reeds or sticks about a foot long wrapped in palm leaves. It is, sometimes, employed in the composition of tooth-powders, but seldom now in medicine. *Pterocarpus Draco* also yields dragon's blood, and other species kino.

Eperua falcata, Aubl., *Dimorpha falcata*, Swartz. The Wallaba resin obtained from this tree in Guiana is inflammable and gives a bright light.

Its styptic and curative powers in cuts and bruises are well appreciated by the Indians and other natives of the Colony. An oil obtained from the wood is also used as a dressing for incised wounds.

Eucalyptus rostrata, Schlechtendal. An exudation from this tree is a most invaluable medicine in certain disorders. It exudes in a fluid state from the bark, and in some instances between the different layers of the wood, and by the evaporation of the watery particles by which it is held in solution, it concretes into a beautiful ruby-colored gum, which, when exposed for a length of time to the air and sun, assumes a black color from an imperfect oxidation, losing at the same time its astringency. This gum is an original astringent principle, analogous in some respects to tannin, the basis of other vegetable astringents, but by no means identical with that compound.

It is more effective than catechu, or Indian kinos, although it contains a less amount of astringent matter.

Dr. J. Sutherland, of Bathurst, Australia, in a communication to my *Technologist* (vol. 3, p. 69), thus speaks of it :

"As a medicine, it is a more powerful astringent than any in our Pharmacopœias, and justly merits a place among the legitimate arti-

cles of the *Materia Medica*. I have prescribed it in a variety of disorders in which astringents are indicated, and found it peculiarly serviceable in certain stages of diarrhœa and dysentery, in passive hæmorrhage, as an injection in leucorrhœa, gonorrhœa and gleet, in scurvy of the gums; as a gargle when the acute symptoms have subsided, in relaxation of the uvula, in hæmorrhoids; in the form of an ointment made by dissolving a drachm of the gum in a teaspoonful of water, and, when intimately mixed, rubbing it up with an ounce of lard. The dose for internal administration varies from one or two grains to twenty, dissolved in water."

Euphorbia officinarum, Lin., or *E. resinifera*, Berg. The above, *E. canariensis*, Lin., and some other fleshy species, produce the saline, waxy resin, called in the shops "Gum Euphorbium," which is the inspissated, milky juice of these plants. It is chiefly obtained in the neighborhood of Mogadore and called "Dergmuce." It is used as a vesicant in veterinary medicine, but is seldom employed otherwise. The inhabitants of the lower regions of the Atlas Range make incisions in the branches of the plant, and, from these, the milky sap exudes, which is so acrid that it excoriates the fingers when applied to them. This exuded juice hardens by the heat of the sun, and forms a whitish-yellow solid, which drops off in the month of September and forms the Euphorbium of commerce. It causes considerable irritation of the nostrils and eyes when powdered. *E. Antiquorum*, Lin., yields a hydrocarbon, gutta-percha-like substance, known as "Cattimandoo," which is the *Dorf* of the Hindus—a much-prized medicine.

Feronium elephantum, Corr.; *Cratœva Valanga*, Kon. This tree yields a brownish or reddish gum with a small proportion of clear, yellow tears, soluble in water. The Pharmacopœia of India pronounces it as superior to gum arabic for medicinal purposes.

Ficus elastica, Roxburgh; *Urostigma elasticum*, Miqu To give some idea of the vastly increasing extent to which rubber, obtained from various elastic saps, is now required, it may be stated that the British imports of caoutchouc, in 1893, were 293,373 cwt., and the United States import even more. The combined imports of India-rubber and gutta-percha into the United Kingdom in 1893, were about 324,000 cwt. Great Britain also imports about 3,250,000 pounds of rubber manufactures. At Wedzell's factories, in Munden and Hildesheim alone, there were produced, a few years ago, over 100,000 pounds of surgical articles from it.

Fraxinus ornus, Lin.; *F. rotundifolia*, Lam.; *Ornus Europæa*, Pers.; or *Ornus rotundifolia*. The sweet exudation, known as "Manna," is chiefly the concrete juice obtained by incising the bark of the ash and collecting it on pieces of stick, hence, called flaky manna. The best is in oblong, light, friable pieces, of a whitish color and somewhat transparent, with a sweetish, sharp taste and a weak smell. The inferior kinds are moist, unctuous and dark-colored. It is a mild aperient medicine. Each hectare (of two and one-half acres) planted with the ash—4,000 to 5,000 trees—produces on an average nearly 2,000 pounds of manna. It used to be produced in Calabria, but that exported comes chiefly now from Palermo, in tin boxes weighing about 14 pounds. Small flake-manna is sent out in cases of about 120 pounds, large flake-manna, in cases of half that size. The export of manna from Italy, in 1884, was about 446,000 pounds. Spurious manna is known by its uniform color and freedom from the slight impurities, as well as from the peculiar odor and slight bitterness of true manna.

Calabria was, many years ago, the only source of the manna of commerce, but the production there has ceased, and, as stated above, Sicily is now the chief seat of production. Manna is nutritious, particularly when recent. It is a mild laxative, does not excite inflammation, useful for children and delicate females, usually operating mildly, but in some cases produces flatulence and pain.

In certain cases, the leaves of *Larix Europæa* exude a species of manna called "Manna of Briancon," which is eaten in Russia. Another kind is from *Tamarix mannifera*, and the Oriental manna of the desert from *Alhagi maurorum*, DeC., *A. mannifera*, Desf. The sugary secretion obtained naturally from this plant is chiefly collected in Khorasan, Kurdistan and Hamadan, and imported into Bombay. As a medicine its effects correspond to those of the ash manna.

The Arabs who cross the deserts avail themselves of the manna of the camel's thorn (*Alhagi camelorum*, Fisch.). It is found in the morning on the ground round the plant, during several days of the summer, and is collected before the sun can melt it. It occurs in small, round, unequal grains, the size of coriander seed, of a yellowish white or greenish yellow color, caking together and forming an opaque mass, in which are found portions of the thorns and points of the plant. This manna is inodorous, its flavor is sweetly saccha-

rine, followed by slight acidity. The Khergesse use it for various kinds of sweetmeats. The inhabitants collect these exudations and make them into loaves or cakes. These soon become of a black color, owing to a kind of fermentation, produced by the air and moisture. The flavor of these manna loaves resembles that of senna in taste; they also resemble senna combined with sweetness. These two characters lead one to suppose that this manna is more purgative than nutritive. Some authors, as Hallé and Guillamin, state that this constituted the manna of the Hebrews, but it is more generally supposed that the *Lecanora affinis*, Eversm, was the substance upon which the Israelites fed in the wilderness.

Some kinds of manna are obtained in Kurdistan from the dwarf oak, tamarisk, and other trees, but are seldom met with in commerce, being used up locally.

A kind of manna is found in small quantities on the branches of the cedar of Lebanon, in the form of transparent, resinous drops, indubitably the result of the puncture of an insect, like the *lerp* of Australia. The monks collect this manna and prepare with it various electuaries and ointments, which are sold to strangers visiting the monasteries. This cedar manna enjoys a considerable reputation in Syria as a remedy in phthisis.

The imports of manna into the United States were as follows: in 1888, 31,703 pounds; in 1889, 25,246 pounds; and in 1890, 43,509 pounds.

(To be continued.)

VOLATILE OIL FROM CANADA BALSAM. —

BY HERMAN L. EMMERICH.

CONTRIBUTION III.

The oil of Canada balsam (*Abies balsamea*, Miller) has been examined by several students of this laboratory during the past few years.¹ The material with which Mr. Kressin worked, in the spring of 1892, has been standing untouched for the past two years. Upon the examination of the bottles containing the fractions mentioned by him, a number of observations were made which invited further examination.

¹ I, was published by Mr. Kressin. Proc. Wisconsin Phar. Assoc. 1892, 66, II, Carl G. Hunkel, AM. JOUR. PHAR. 67, 9.

FRACTION I.

The bottle containing this fraction was filled completely and well stoppered. The oil possessed a pale straw color and a terebinthinate odor. Its relative density was found to be 0.900 at 20° C. In a 100 mm. tube, it deviated the ray of polarized light 24.83° to the left; hence, (α) D equals — 27.59°.

Since Mr. Kressin had not determined any other constant than the boiling point of this fraction, no comparisons could be made. Mr. Kressin's note (page 67) refers to Fraction II, not Fraction I, of Mr. Kradwell. However, one will certainly not go far amiss to suppose that the (α) D for this fraction was about — 34° (compare table p. 67).

Upon analysis this fraction yielded the following results:

- I. 0.2034 gms. of substance yielded 0.1914 H₂O = 0.02125 H.
and 0.6191 CO₂ = 0.1688 C. *
- II. 0.2182 gms. of substance yielded 0.2324 H₂O = 0.0258 H.
and 0.6638 CO₂ = 0.18103 C.

Calculated for C₁₀H₁₆.

	Per Cent.	Found.	
		I. Per Cent.	II. Per Cent.
C.	88.23	83.01	82.96
H.	11.76	10.45	11.83

Although the boiling-point of this fraction, as well as its odor, indicated the presence of pinene, the amount of oxygen present, 6.5 per cent., clearly indicated that it was by no means pure.

That pinene is present in the oil has been clearly demonstrated. That it is present also in this fraction was shown by means of its nitroso chloride, 6.54, 10.17 and 11.25 per cent., respectively, being obtained in three different experiments. That the yield should be much greater in these experiments than in those made by Mr. Kradwell and Mr. Kressin, is now easily understood, if one takes into consideration the results of E. W. Smith on the yield of nitroso chloride of pinene from oils of different rotatory power.¹ The decrease in the rotatory power of this fraction, after two years, standing, is sufficient explanation for the increased yield of nitroso chloride. The melting point of the nitroso chloride, after purification, was found to be rather high, viz.: 107° C. However, the nitrol-benzyl-amine base closely resembled the nitrol-benzyl-amine pinene. It melted at 122° C.

¹ Proc. Wisconsin Phar. Assoc., 1891.

Since the bottle in which this fraction was contained was completely filled and well stoppered, it did not appear very probable that a large amount of oxygen should be due to the presence of pinol-hydrate, or any other oxidation product of pinene that might result upon standing.

To ascertain whether it was present in the form of an ester, 25 c.c. of this fraction were boiled with 62 c.c. of a 6.68 per cent. alcoholic solution of potassa for four hours. Upon titration with decinormal sulphuric acid, V. S., it was ascertained that 0.6978 gms. of potassa had been consumed in the experiment, corresponding to 2.442 gms., or 10.85 per cent. of bornyl or terpinyl acetate. Upon distillation with water, a camphoraceous odor was very perceptible, but it was impossible to separate crystals. The experiment was repeated on a larger scale, 100 gms. of oil being used.

After saponification and distillation with water-vapor, 49 gms. of oil were obtained. A black, shining, pitchy residue was left in the distillation flask. The oil was colorless, and possessed a mixed terebinthinat and camphoraceous odor. After drying with anhydrous copper sulphate, its relative density was found to be 0.864 at 20° C. In a 100 mm. tube, it deviated the plane of polarized light 30.18° to the left, hence (α) D equals — 34.93°. Upon fractionation, the following fractions were obtained :

Boiling Point.	Percentage.	Relative Density at 20° C.	(α) D.
— 155°			
155° — 161°	about 25.00	0.8657	— 34.267°
161° — 164°	about 24.00	0.8728	— 34.254°
164° — 167°	about 23.6	0.8743	— 34.34°
167° — 170°			
170°			

Upon exposure to cold for several days, no crystals separated. Fraction 170° was further fractionated, and fractions 170 — 180° and 180° + were obtained ; fraction 180° + was exposed to a freezing mixture. Crystals resembling borneol were obtained, but the yield was too small to allow isolation.

FRACTION III.

The bottle containing this fraction was almost filled and well stoppered. The oil possessed a pale straw color and a terebinthinat odor, very much like Fraction I. Its relative density was found to be 0.903 at 20° C. In a 100 mm. tube it deviated the

plane of polarized light 25.4° to the left, hence $(\alpha)_D$ equals — 28.128° .

Mr. Kressin had determined the physical constants of this fraction. On comparison, it will be seen that the relative density had increased 0.045, and that its optical activity had decreased 6.61° .

Upon analysis this fraction yielded the following results:

- I. 0.2031 gms. of substance yielded $0.6236 \text{ CO}_2 = 0.1681 \text{ C.}$
and $0.2081 \text{ H}_2\text{O} = 0.023 \text{ H.}$
II. 0.1776 gms. of substance yielded $0.5459 \text{ CO}_2 = 0.1488 \text{ C.}$
and $0.1854 \text{ H}_2\text{O} = 0.0206 \text{ H.}$

Calculated for $\text{C}_{10}\text{H}_{16}$.

Per Cent.

C. 88.23

H. 11.76

Found.	
I.	II.
Per Cent.	Per Cent.
83.739	83.829
11.423	11.599

That pinene was present also in this fraction was proved by means of its nitroso-chloride 7.136 — 7.7 — 6.39 per cent., respectively, being obtained in three different experiments. The melting-point of the nitroso-chloride proved to be 102° – 103° C. To further establish the presence of pinene, the benzyl-amine base was prepared, which closely resembles pinene-nitrol-benzylamine. Its melting-point proved to be 122° C.

FRACTION VIII.

The bottle containing this fraction was about one-quarter filled and well stoppered. The sides were covered with small acicular crystals, presumably pinol-hydrate. The oil was filtered and dehydrated by means of anhydrous sodium sulphate. The oil was of a slightly yellowish tinge, almost colorless, and possessed a terebinthinate odor, though less marked than the lower fractions. Its relative density at 20° C. was found to be 0.8805. In a 100 mm. tube it deviated the plane of polarized light 30.187° to the left, hence $(\alpha)_D$ equals — 34.304° .

Compared with Mr. Kressin's constants we found the relative density had increased 0.211 and its optical activity had decreased 5.893° .

Upon analysis this fraction yielded the following results:

- I. 0.231 gms. of substance yielded $0.7138 \text{ CO}_2 = 0.1947 \text{ C.}$
and $0.2466 \text{ H}_2\text{O} = 0.0274 \text{ H.}$
II. 0.258 gms. of substance yielded $0.8036 \text{ CO}_2 = 0.21916 \text{ C.}$
and $0.2932 \text{ H}_2\text{O} = 0.03257 \text{ H.}$

Calculated for $C_{10}H_{16}$.

Per Cent.

C. 88.23

H. 11.76

Found.	
I.	II.
Per Cent.	Per Cent.
84.27	84.946
11.86	12.62

FRACTION IX.

The bottle containing this fraction was about one-quarter filled, well stoppered, and showed no crystals on its surface. The oil possessed a faint terebinthinate odor, and was almost colorless. It had separated into two strata.

The lower stratum was colorless, and possessed a terebinthinate odor. The relative density of the dehydrated oil at 20° C. was found to be 0.8483. In a 100 mm. tube it deviated the plane of polarized light 31.666° to the left, hence (a) D equals — 37.332°.

Upon analysis it yielded the following results:

- I. 0.1928 gms. of substance yielded 0.6048 CO_2 = 0.16493 C.
 and 0.2116 H_2O = 0.0235 H.
 II. 0.2736 gms. of substance yielded 0.864 CO_2 = 0.2356 C.
 and 0.2946 H_2O = 0.0323 H.

Calculated for $C_{10}H_{16}$.

Per Cent.

C. 88.23

H. 11.76

Found.	
I.	II.
Per Cent.	Per Cent.
85.54	86.12
12.19	11.96

The upper stratum was barely colored, possessed a pleasant fragrance, reminding of lemon oil. After dehydration the relative density was found to be 0.8257 at 23° C. In a 100 mm. tube it deviated the plane of polarized light 13.637° to the left, hence its (a) D equals — 16.527 at 23° C.

Upon analysis it yielded the following results:

- I. 0.1758 gms. of substance yielded 0.3959 CO_2 = 0.10797 C.
 and 0.1996 H_2O = 0.02217 H.
 II. 0.1997 gms. of substance yielded 0.457 CO_2 = 0.124635 C.
 and 0.2274 H_2O = 0.02415 H.

Calculated for $C_{10}H_{16}O$.

Per Cent.

C. 78.947

H. 10.526

Found.	
I.	II.
Per Cent.	Per Cent.
61.418	61.91
12.61	12.09

The quantity of this fraction was not sufficient to allow of further experimentation.

As will be seen from the quantity of oxygen in fractions 1 and 9 the composition of this oil is much more complex, than was supposed. The investigation will be continued.

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REFERENCES.

- (1) Gustave V. Kradwell, *Proc. Wisc. Pharm. Ass.*, 1891, p. 37.
- (2) Louis H. Kressin, *ibidem*, 1892, p. 66.

A CHEAP SUBSTITUTE FOR THE SELENITE.

BY HANS M. WILDER.

A set of selenite plates (generally three) is an indispensable adjunct to the polarizing outfit, because of the beautiful display of colors caused by their use.

Having on a certain occasion mislaid my selenites, I looked about for a substitute, and bethought myself of trying what mica, which is stated to possess similar light-retarding power as selenite, might do. To my agreeable surprise mica (the common stove-door kind) proved to be fully equal to any ordinary selenite, the colors being quite as handsome. Mica possesses two advantages: It is much cheaper, a piece three inches square costing about two cents, while a selenite (the usual size of which is $\frac{5}{8}$ of an inch) costs from one dollar up, and mica can be cut with scissors and handled without much fear of breaking it. The best way to proceed is as follows:

Put a slide of any polarizing substance (starch for instance) on the stage of the microscope, having previously put the two nicols in their places, and slip a piece of mica under the slide. Some kind of color will be observed. If not satisfactory or especially handsome, give the mica a slight turn around its axis, and try in this way whether in any position a satisfactory color is obtained. When found, cut one end square so as to be parallel with the slide; by always slipping in the mica in the same way the same color display will be obtained, since the retarding power and consequently the color varies with the thickness. Quite a variety of beautiful color effects may be obtained by either using mica plates of varying thickness, or by merely using two or more layers of thin plates superimposed. The colors may be varied still more by altering the

relative positions of the superimposed plates; in fact, three plates of varying thickness will be all that are necessary to keep. As stated before, mica costs next to nothing; if, therefore, the first piece does not suit, throw it away and try another. Select the clearest pieces. The mica plates may be cut and mounted to suit. Personally, I prefer strips about $1\frac{1}{2}$ inches wide, and somewhat longer than the stage from front to back, so as to be easily slipped in under the slide, and as easily removed.

NOTES ON BEESWAX, PETROLATUM MOLLE AND ROCK CANDY SYRUP.

BY LYMAN F. KEBLER.

About a year ago¹ I presented some notes on the examination of beeswax. Since then I have examined a goodly number of samples of this article, and not until recently have spurious goods come into my hands. This section of the country appears to be especially favored with highly adulterated beeswax,² some containing as high as 80 per cent. of paraffin, some composed of black earthy matter moulded into cakes and cleverly coated with yellow wax, other samples containing chrome-yellow, mineral matter, rosin, etc. Probably some sections do not report the results of their examinations.

It has frequently been asserted that beeswax is weighted with mineral matter such as gypsum, kaolin, yellow ochre, heavy spar and various other adulterants. I had come to the conclusion that the days of such gross sophistications were past, but the examination of four samples recently convinced me that this opprobrious business had been awakened from the slumber room of time, if it has been asleep. These four samples were composed of rosin, chrome yellow, yellow ochre, hæmatite, mineral wax and a little beeswax. A fifth sample was composed of about equal parts of mineral wax and beeswax. The following table contains the analytical data of the adulterated beeswax. Number 1 is a beeswax of known purity for comparison:

¹ 1893, Am. J. Pharm., 65, 585.

² 1874, Am. J. Pharm., 46, 510; 1875, Proc. Am. Pharm. Assoc., 23, 232 and 499.

Serial Number	M. P. C°.	Sp. Gr. at 15° C.	Acid Number.	Ether Number.	Total.	Ratio.	Adulterants.
1	63·8	0·964	19·60	75·60	95·20	3·857	<div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;"> <div style="display: inline-block; vertical-align: middle;">Resin, paraffin, chrome yellow.</div> <div style="display: inline-block; vertical-align: middle;">Yellow ochre, earthy matter, paraffin.</div> <div style="display: inline-block; vertical-align: middle;">Earthy matter, paraffin, hæmatite.</div> <div style="display: inline-block; vertical-align: middle;">Mineral wax.</div> </div> </div>
2	48·0	0·925	25·13	48·30	73·43	1·122	
3	52·0	0·910	4·20	12·60	16·80	3·000	
4	55·0	0·925	4·61	16·10	20·71	3·492	
5	66·0	0·935	11·20	37·61	48·81	3·358	
6	74·0	0·921	10·50	19·60	30·10	1·866	

I have not added additional data, since they can be easily calculated from the above.

These samples of beeswax are curiosities, and if the specimens alone existed, it would be well and good, but that they represent hundreds of pounds in this market is a deplorable fact.

PETROLATUM MOLLE. —

The U. S. P. requires this product to be ointment-like in consistence, odorless, tasteless, with a melting point varying from 40° to 45° C., and a specific gravity ranging from 0·820 to 0·840, at 60° C. It should be completely volatilized when heated on a piece of platinum without emitting any acrid vapors, and be free from resin and saponifiable fats and oils. When one volume of petrolatum is treated with two volumes of concentrated sulphuric acid in a test-tube placed in hot water and agitated occasionally during fifteen minutes, the acid should neither acquire a deeper tint than brown nor lose its transparency.

The following table contains the analytical results of nine samples of petrolatum molle :

Description.	M. P. C. °.	Sp. Gr. at 60° C.	Color of H ₂ SO ₄	Transparency of H ₂ SO ₄	Taste and Odor.	Saponifiable Matter.
Lily white . .	51	0·825	Brown	Semi-transparent	None	None
Snow white . .	50	0·829	Brownish	"	"	"
Snow white . .	40	0·823	Light Brown	Transparent	Decided	"
Cream white . .	54	0·834	Brown	Opaque	None	"
Pearl white . .	49	0·831	Brown	"	"	"
Pearl white . .	47	0·827	{ Blackish Brown }	"	Some	"
Pearl white . .	49	0·823	Brownish	Semi-transparent	None	"
Light yellow . .	48	0·830	Brown	Opaque	Some	"
Light amber . .	54	0·821	{ Blackish Brown }	"	None	"

Each sample completely volatilized on platinum foil without any acrid vapors, was ointment-like in consistence, neutral and soluble in its various solvents.

Two French chemists have recently made numerous comparative tests with petrolatum, and came to the conclusion that this article was highly adulterated with fatty substances of both animal and vegetable origin. For easily detecting this sophistication 5 drops of a saturated solution of potassium permanganate are added to 5 grams of petrolatum, in a glass or porcelain mortar and triturated. If the petrolatum is pure the rose-red color is persistent ; if saponifiable fats or oils are present the color becomes chestnut-brown. The intensity of the color is directly proportional to the percentage of admixture.

I applied the permanganate test to each of the above samples, but no chestnut-brown was obtained in any case.

ROCK CANDY SYRUP.

"Rock Candy Syrup" is generally considered to be the evaporated mother-liquor obtained in the process of manufacturing "Rock Candy." This product necessarily contains more or less reducing sugar. We must remember, however, that this article is also prepared by dissolving granulated sugar itself in a specified quantity of water, sometimes using an antiseptic. A certain manufacturer informed me that he used one ounce of salicylic acid for every 500 gallons of syrup. I was unable to detect it, however, even after having been informed concerning its employment.

This commodity has largely come into use in this country within recent years. Being differently prepared by various producers it necessarily varies in composition. In view of these facts it behooves us to examine carefully every sample before employing it for any use.

Some workers have expressed themselves quite adversely concerning this product, calling it worthless and not deserving a place in the drug market. Certain examiners while in quest of a pure rock candy syrup called the work "monotonous" since the danger signal flashed in every case, even with rock candy itself. While I realize that he who shuts his eyes to the adulteration of drugs is not the pharmacists' friend, yet I contend that it is not just to condemn all rock candy syrups because a few are spurious.

I have examined a fair number of samples and find the percentage of good rock candy syrup as high as that of other goods handled by druggists. Below you will find a table recording the results of a

number of samples examined during the past year. Some were excellent products, products that no pharmacist need reluctantly place on his shelf as rock candy syrup. A few were extremely bad.

Serial Number.	Sp. Gr. at 15° C.	Reducing Sugar.	Reaction.	Inorganic Compounds.
1	1'324	Trace per cent.	Neutral.	None.
2	1'315	Trace per cent.	Slightly acid.	None.
3	1'346	57.50 per cent.	Acid.	Sulphates.
4	1'330	Trace.	Slightly acid.	None.
5	1'322	6.5 per cent.	Slightly acid.	None.
6	1'330	17.85 per cent.	Neutral.	Sulphates & Chlorides.
7	1'330	20.00	Neutral.	Sulphates & Chlorides.
8	1'325	Trace.	Neutral.	None.
9	1'327	Trace.	Slightly acid.	None.
10 ¹	1'571	36.13 per cent.	Slightly acid.	None.
11	1'322	5.00	Slightly acid.	None.
12	1'340	7.00 per cent.	Slightly acid.	None.

¹ Highly flavored with vanilla.

My standard for "Rock Candy Syrup" is; sp. gr. about 1.320 at 15° C., from a trace of reducing sugar to two per cent., neutral or slightly acid in reaction.

You will notice that every sample contains some reducing sugar. Simple syrup on standing a short time is said to deteriorate, forming reducing sugar. Some say simple syrup on being boiled is slowly converted into reducing sugar, but my experiments do not support this latter assertion.

A carefully prepared syrup, sp. gr. 1.330, free from glucose, was boiled vigorously for 1½ hours, the evaporated water carefully replenished from time to time. A drop of the syrup was tested every fifteen minutes for reducing sugar, but not a trace was detected in even the last test.

IMPROVEMENT IN THE MANUFACTURE OF ACETONE.¹

By E. R. SQUIBB, M.D., Brooklyn, N. Y. —

The increasing use of acetone as a chemical solvent, and especially the relation of acetone to the manufacture of chloroform, gives importance to any improvement in its production.

Up to this time the writer knows of no process of manufacture except by the destructive distillation of acetates at high temperature. The acetates are charged into stills and heated as long as they yield any acetone. Then the acetates being decomposed to waste carbonates are discharged and the stills

¹ *Ephemeris*, Vol. 4, No. 3.

recharged with fresh acetate, making an interrupted process of repeated charging and discharging and heating and cooling. This process is very old; but two patents have been taken out in this country on some details of the process and apparatus.

The writer proposed to himself to make acetone directly from acetic acid by a continuous process, and has accomplished that object.

In Gmelin's Hand Book of Chemistry, Cavendish Society edition, 1853, Vol. VIII, at page 291, under the head of decomposition of acetic acid by heat, much work is given where the vapor of acetic acid was passed through heated tubes, acetone being one of the products; and, on this line of investigation, the writer's work was taken up.

It was not difficult to see that the discrepant results reached by the authorities were due to differing physical conditions, and different degrees of heating, since it was mechanically quite certain that a current of vapor passing through a stationary tube, heated from below, whether empty or filled, could not be heated to the same degree in all parts of the tube, and therefore could not give the same decomposition in all parts.

The work undertaken was commenced in very long-necked, glass bulbs, held in a horizontal position so that they might be stationary or be revolved by hand, and these were heated by a bath of Wood's metal—the acid being passed in, and the products coming out through horizontal tubes in the long necks.

Experiences with these bulbs led to much better mechanical devices. A small flask was arranged as a still, and from this, by a gas burner, a constant current of acetic acid vapor could be produced at any desired rate. The rate was regulated by the rate of supply of liquid acid from an elevated graduated supply vessel, the supply going to the still through a glass tube, in which the rate of dropping was seen and controlled by stop-cock. Then, by varying the acid supply and the heat from the burner, the boiling liquid in the still could be kept at about a constant level, and with a controllable known rate of vapor supply.

At some distance from this end of this apparatus the condensing apparatus was arranged to receive the distillates. The products of distillation were first received in a flask where most of the watery vapor and undecomposed acid was condensed, but where the temperature continued so high that but a mere trace of acetone was arrested there. From the neck of this flask the remaining gases and vapors passed through a good condenser which delivered the remainder of the water and undecomposed acid and the acetone into a flask immersed in an ice bath. Here almost all the condensible vapors were condensed. The gases and uncondensed vapors were taken from the neck of this flask to a small wash bottle supplied with water, by which the current of gases was washed. Here waste acetone enough was caught to increase the volume of contents to a point at which all went off together in the current of gases, and the level remained constant. Next was a wash bottle containing a strong solution of sodium hydrate. Through this the residual gases were passed in order that most of the carbon dioxide might be combined. Finally the gases were passed through another small wash bottle containing water. At the small exit tube of this bottle the gases were tested for inflammability, and the proportion of methane and carbon monoxide was estimated by the absence or the degree of inflammability. Except at the times of testing, this exit tube was

connected to a Sprengel water pump, and a minus pressure of 1 to 6 Cm. of mercury was maintained on the entire apparatus. This served to relieve all joints and connections and caused all the leakages to be inward, whilst a mercury gauge at each end gave due notice of obstruction or irregularities.

These two ends of the apparatus remaining constant, the intervening space was occupied by the varying form of distilling or decomposing apparatus. An earthenware drain pipe with movable tile ends served as a furnace. This drain pipe, supported in a horizontal position, had 6 holes drilled above and below. Each lower hole was large enough to admit a Bunsen burner with limited air space around it, while the holes on top, to give exit to the products of the combustion, were smaller. The decomposing tubes or stills of wrought iron, with cast-iron ends, occupied this drain pipe furnace, being connected with the vapor supply apparatus at one end and the condenser at the other.

Much preliminary work was necessary in getting the apparatus in good working order and in following up tangential points; but these are passed over, and only the important work given—and that not always in the order in which it was done, but in an order which brings the results into a more logical sequence more easily understood.

Two strengths of acetic acid were used. First, an acid containing 36 p. c. of absolute acid. But as this gave distillates unnecessarily dilute, it was generally given up in favor of a 60 p. c. acid, although the reactions were not noticeably different in the use of the two strengths. Hence, with two exceptions, the results given are from a 60 p. c. acetic acid.

Reducing the work from the disorderly way in which it was done to a natural order, and rejecting what was not trustworthy, it is best to begin with some repetitions of work already long on record. (See Gmelin's Hand Book, and other authorities.)

A tube of wrought iron about 36 Cm. (14 inches) in length by 6.5 Cm. (2.5 inches) internal diameter, reduced at each end to tubing of about 0.6 Cm. (.25 inch), was held stationary in the centre of the furnace, and connected at one end with the acid vapor supply, and at the other with the condensers. This tube could be heated by the gas burners to any desired degree up to a dull red heat. The trials were made under as nearly the same conditions as practicable, the running time being about 3.5 hours, and under close observation. The amount of 60 p. c. acetic acid which could be passed in in vapor during this time, varied much—generally 250 to 350 Cc. The quantities used were always reduced to absolute acid ($\text{HC}_2\text{H}_3\text{O}_2 = 59.86$), and the results are given in the same acid, but a high degree of accuracy was impracticable, and therefore not aimed at.

(1) With the tube empty and heated nearly to redness at first, and finally to dull red heat, 290 Cc. of 60 p. c. acid = 174 Gm. absolute acid, was passed in in 3.5 hours. About 111 Gm. of this acid passed through unchanged, and 63 Gm. was decomposed. That is, about 63.8 p. c. came through unchanged, and 36.2 p. c. was decomposed. In the first receiving flask, kept hot by the vapor, there was no acetone, but only 132 Cc. of a 53 p. c. acid. In the second flask, in the ice-bath, there was 115 Cc. of a 36 p. c. acid; and this liquid, roughly estimated by the iodoform test, contained 10 to 12 p. c. of acetone. From the final wash bottle came a stream of inflammable gas—probably methane and carbon monoxide—that would burn almost continuously.

(2) Next this stationary tube was filled with coarsely-granulated pumice-stone, freed from large pieces and from dust, and so tightly packed as to have spring enough to keep the tube full when expanded by heating. Into this, in 3.5 hours, 189 Gm. of absolute acid, in vapor, was passed, and yielded in the first, hot flask 103 Cc. of 54 p. c. acid = 55.62 Gm. absolute acid. In the second, ice-bath flask 138 Cc. of 38.4 p. c. acid = 52.97 Gm. of absolute acid, making 108.6 Gm. out of 189 Gm. distilled over unchanged, and 80.4 Gm. decomposed. The contents of this second flask were about 14.5 p. c. acetone. The stream of inflammable gases was estimated as being not less, but rather greater than with the empty tube.

(3) Next, took the pumice from the tube, divided it into two parts, and, rejecting one-half, intimately mixed with the other half 500 Gm. of dry precipitated barium carbonate. Charged the tube with this mixture, having a little unmixed pumice at both ends. Barium carbonate was selected to multiply surface, as being a rather heavy powder that would not shrink nor fuse, nor be likely to decompose.

About 450 Cc. of 60 p. c. acid = 270 Gm. of absolute acid was passed, in vapor, in 3.5 hours, into this mixture, heated as before. The distillate in the first hot flask was 81 Cc. of acid water of only 1.6 p. c. = 1.3 Gm. absolute acid. In the second ice-bath flask was 227 Cc. s. g., about 0.955, containing 1.2 p. c. acid = 2.7 Gm. absolute acid. Of the 270 Gm. passed in, 4 Gm. only distilled over unchanged, while 266 Gm. was decomposed. The 227 Cc. of distillate in the second flask contained about 23.3 p. c. of acetone. This proportion gives about 20 p. c. of acetone from the 266 Gm. of absolute acid used. The stream of inflammable gases was very much greater than in the other experiments, burning with an almost continuous large flame.

The desired splitting of acetic acid to yield acetone requires 2 molecules of the acid to yield 1 molecule of acetone, the residuary products being 1 molecule each of carbon dioxide and water. That is, 120 Gm. of absolute acetic acid should give

58 Gm. of acetone,
44 " " carbon dioxide,
18 " " water, or

by percentage the acid should give

48.33 p. c. acetone,
36.67 " carbon dioxide,
15.00 " water.

When marsh gas or methane (CH_4) and carbon monoxide (CO) are formed it is probably largely, if not entirely, through a secondary decomposition of the acetone by a higher heat than that which gives the primary decomposition into acetone, carbon dioxide and water, and when acetone and methane are produced together, it is rational to suppose that inequalities of heating are the cause. That is, if acetone be produced it indicates that the exact conditions required are present at that time and place. Then it follows that if these exact conditions be extended throughout the whole time and place of reaction, the acetone splitting of the acid only can occur, and no methane or other products of other reactions can be produced. The conditions for producing these different reactions are doubtless different degrees of heating, and uniformity of reac-

tion can be expected only from uniformity of heating. And the differences in the degrees of heat required to produce the different reactions here do not seem to be great.

The physical and mechanical conditions of heating a stationary tube cannot possibly yield an equal degree of heating to the contents of such tube, especially where only a part of such contents is in motion. Even if the whole outside of the tube could be equally heated—as it could not be practically—the contents would be cooler from circumference to centre. But in this case, where a current of vapor at about 100° C. is passed continually into a tube, the outside of which is kept unequally heated to 500 or 600° C., and where this current has to find its way at varying speed through varying friction and expansion, only a varying decomposition can be possible, and the conclusion must be that if uniform decomposition is to be reached it must be through uniform conditions.

Equable heating in a stationary tube, under the conditions of this process, being impracticable, it became necessary to devise some better form of still; and a careful consideration of the principles involved, and the especial mechanical difficulties of this decomposition, led the writer to a form of rotary still, which, after some alterations and modifications, has proved successful.

A wrought-iron tube about 36 Cm. (14 inches) long by 12.7 Cm. (5 inches) in diameter, contracted at the ends to central, hollow journals of about 2 Cm. (0.75 inch) external diameter and 1.2 Cm. (0.5 inch) bore, free to revolve, was supported in the centre of the 18 Cm. (7 inch) drain pipe furnace, and connected at one end with the vapor supply, and the other with the condensers by air-tight glands or “stuffing-boxes.” The ends were provided with charging and discharging openings which could be closed air-tight, and the still was revolved slowly by means of a pulley on one end of the hollow shaft. A small stationary tube passed into the still through the revolving shaft to convey the acid vapor to the entrance of the still at one end, and a similar tube gave exit to the products of the decomposition at the other, condenser end. It was necessary to protect this tube from obstruction by dust carried by the current of vapors, and this was done by a cartridge of rolled-up, wire cloth filled with glass wool. This rotary still was driven at the rate of three to six revolutions per minute by a small water-motor, and was found to heat with great equability as it revolved over the burners. Inside of the still, at equal distances apart on the periphery, five L-shaped, longitudinal strips of sheet-iron were riveted. These were necessary to prevent the charge from sliding round as the iron became smooth, and they were found to carry the charge round, turn it over and mix it most effectively at each revolution. Thus, while by the revolutions over the source of heating the shell was heated very uniformly, this continuous moving and turning over of the contents must bring all parts of the charge, solids and vapors alike, in successive contact with the hot surfaces and the cooler atmosphere of the still, and thus secure a fair degree of equable heating. The still being about one-third filled with the solid charge and slowly rotated, the charge occupies principally, not the bottom of the still directly over the fire, but the ascending third which has just been over the fire. Then, as the charge is carried up, the superficial cooler portion, too deep to be held by the longitudinal shelves, slides back onto the hot surface below, while the portion carried on by the shelves falls back, shelf by shelf, from contact with the hot shell through

the atmosphere of vapor, onto the cooler portions below, to be mixed and carried up again in a similar order. At the same time the whole atmosphere of the still is filled with dust which becomes very fine, and very largely multiplies the surfaces of contact with the vapor for decomposition, whilst the vapors pass slowly and uniformly and with a minimum of friction to the exit at the condenser end. If the motion and heating of a charge in this still be compared with those in a stationary still with a horizontal stirrer driven by a vertical shaft, the advantages of the former will be easily understood. The latter moves the charge round over the fire, but has a comparatively slight effect in bringing new portions of the charge successively in contact with the heating surfaces, and it does not tend to prevent horizontal stratification of the charge with consequent irregular heating; and it does not tend to the fullest contact of the vapors with the surfaces of the charge, where the decomposition probably takes place. After the inevitable number of trials and adjustments and breakings down, the following successful experiments are selected from a large number:

(4) As a parallel experiment to (1) with the stationary still, the rotary still was used empty.

About 200 Cc. of 36 p. c. acid = 72 Gm. of absolute acid was slowly passed into the heated, rotating, empty still.

The first hot flask of distillate contained 33 Cc. of acid of 14.6 p. c. = 4.82 of 17.89 Gm. absolute acid.

The second ice-bath flask contained 142 Cc. of acid acetone, 12.6 p. c. Gm. absolute acid. Then $4.82 + 17.89 = 22.71$ Gm. absolute acid distilled over unchanged. Then 72 Gm. — $22.71 = 49.29$ Gm. of acid decomposed. The second distillate gave an estimate of 12.1 Gm. acetone. Then as 49.29 acid : 12.1 acetone : : 100 : 24.5 p. c. acetone from the acid. The current of inflammable gas was considerable, but less than in (1).

(5) The rotary still was charged with about a litre of the same granulated pumice used in (2), and when heated about 295 Cc. of 60 p. c. acid = 177 Gm. of absolute acid, was passed in in vapor during 3.5 hours.

The first distillate, hot flask, had 108 Cc. of acid water of 4.4 p. c. = 4.75 Gm. acid.

The second distillate, ice-bath flask, had 116 Cc. acid acetone 2.4 p. c. acid = 2.78 Gm. acid.

Then $4.75 + 2.78 = 7.53$ Gm. acid came over unchanged, out of 177 Gm. passed in; or, $177 - 7.53 = 169.47$ Gm. decomposed.

The acetone estimated by iodoform was 24.3 p. c. of the acid decomposed.

(6) About 500 Gm. of precipitated barium carbonate was put into the rotary still on top of the charge of pumice, and when the whole was heated 380 Cc. 60 p. c. acid = 228 Gm. of absolute acid was passed in in vapor during 3.5 hours.

The first distillate was 108 Cc. of acid water containing 3.9 Gm. acid.

The second distillate was 135 Cc. of acid acetone containing 2.7 Gm. acid. 228 Gm. acid — 6.6 Gm. over unchanged = 221.4 Gm. decomposed.

The estimated acetone was 16 p. c. of the acid decomposed.

Much inflammable gas throughout the process.

(7) About 456 Gm. of precipitated barium carbonate put into the cleaned-out rotary still, and when heated 510 Cc. of 36 p. c. acid = 183.6 Gm. absolute acid

was passed in in 4.5 hours. About 24.5 Gm. of acid came over unchanged, leaving 159.1 Gm. decomposed.

The acetone was estimated at 53.7 Gm., or about 34 p. c. of the decomposed acid.

(8) Charged the rotary still with 1,000 Gm. of dry barium acetate and distilled this acetate as long as it would yield a distillate, and until it was reduced to about 770 Gm. of barium carbonate quite free from acetate. This yielded acetone estimated by iodoform at about 60 p. c. of the theoretical quantity.

When the distillation from the acetate had ceased the receivers were changed and 490 Cc. of 60 p. c. acid = 294 Gm. of absolute acid were passed into this charge of carbonate in about 4.5 hours.

The distillate was received in 5 fractions.

1st.	37 Cc. of acid water containing	15.6 p. c. acid or	5.77 Gm.
2d.	256 " " dilute acetone "	4.4 " " "	11.26 "
3d.	230 " " " " "	9.6 " " "	22.08 "
4th.	46 " " " " "	11.0 " " "	5.06 "
5th.	26 " " " " "	17.6 " " "	4.58 "

595 Cc.

Distilled over undecomposed, 48.75 Gm.

294 Gm. — 49 Gm. = 245 Gm. decomposed.

In each of the 2d and 3d flasks was about 40 Cc. of water at the start. Then 80 from 595 gave 515 Cc. of total distillate from the 490 Cc. fed in.

Acetone required from 245 Gm. acid 118 Gm. Estimated yield 71 Gm., or 60 p. c. of the required yield.

On the following day, without having opened the still, it was reheated and 530 Cc. of 60 p. c. acid = 318 Gm. of absolute acid was passed in in vapor. From low street pressure in the gas mains the heat on this day was deficient.

1st distillate	50 Cc. acid water containing	19.6 p. c. acid or	9.8 Gm.
2d	255 " dilute acetone "	10.0 " " "	25.5 "
3d	138 " " " "	6.0 " " "	8.2 "

443 Cc.

43.6 Gm.

318 Gm. — 44 Gm. = 274 Gm. acid decomposed.

Acetone required from 274 Gm. acid 132 Gm. Estimated yield 95 Gm. or 72 p. c. of the required yield.

On the day following, again without opening the still, in about 4 hours, passed in 535 Cc. of 60 p. c. acid = 321 Gm. of absolute acid.

1st distillate, hot flask,	22 Cc. acid water containing	7.6 p. c. acid or	1.67 Gm.
2d	ice-bath, 258 " dilute acetone "	4.8 " " "	12.38 "
3d	" " 131 " " " "	7.6 " " "	9.96 "

411 Cc.

24.01 Gm.

321 Gm. — 24 Gm. = 297 Gm. acid decomposed.

Acetone required by theory from 297 Gm. acid 143 Gm. Obtained by estimate about 113 Gm. or nearly 80 p. c. of the required yield.

Now, upon cooling and opening the still, samples taken from various parts of the contents were all found to be barium carbonate and free from acetic acid.

During the progress of these distillations from pumice stone, from carbonates and from the empty stills alike, whenever the supply of acid vapor was cut off the distillation almost instantly ceased, showing that there was then nothing in the still to decompose.

This, then, is the improved, continuous process for the production of acetone directly from the acetic acid, which avoids and saves the intermediate steps of forming and decomposing acetates.

The formation of acetates in the still was repeatedly tried with both barium and calcium carbonates, but always failed until the temperature was reduced to about the boiling point of water, or the condensing point of watery vapor, and then the acetates formed, cohered and adhered to the ribs and shell of the still, and no longer moved until again decomposed by a higher heat.

Corresponding trials were made with calcium carbonate and with calcium acetate decomposed to carbonate, with results very similar to those above given, but the barium carbonate seemed to answer best, possibly because it yields a heavier powder that occupies less space and moves better.

When commercial acetate of lime was used tarry matters obstructed the exit tubes and contaminated the distillates. The portion of these tarry matters that was reduced to charcoal in the still, and there mixed with the carbonate, seemed to be rather beneficial than obstructive. But on the whole the process appeared to do better with carbonates reduced from acetates that were made for the purpose from good materials. As the process seems to be rather a mechanical or physical one of surface contact, it would be reasonable to expect better results from reduced carbonates than from precipitated carbonates. And it is still an open question whether, on the large manufacturing scale, with better control of the essentials, heat and motion, pumice or bone black, or some other such substance, will not be better than the carbonates. Of one thing the writer is convinced, and that is that the close regulation of the heating within narrow limits of variation, is far the most important element in the process. Within very narrow limits, too little heat gives undecomposed acid, while too much gives inflammable gases in place of acetone. But on the large scale this element will be under much better control, whilst a proportionately longer still will give the acid vapor farther to go and a prolonged exposure to the limited heating and contact.

There are no patents sought for on this process or apparatus.

The dilute acetone from this process is fairly good and clean, and is colorless except for the action of the free acid contained on the iron tubing. With the free acid the s. g. by hydrometer varies between 0.93 and 0.97. No part of the distillate has more than a thin film of oil on the surface too small to be measured, and this oily surface is only in the first flask with the acid water. On further dilution of the ice-bath distillate it is rendered opalescent for a minute or two and then becomes again transparent.

This distillate (undiluted) is a good solvent for many substances, and is probably pure enough for the manufacture of chloroform.

When allowed to stand some days upon caustic lime and then poured off and rectified, it is much improved in character and strength, and is then adapted

to a still larger number of uses, and is perhaps better adapted to the manufacture of chloroform.

The product of this first rectification was then digested with about 10 p. c. of dry calcium chloride. This abstracted most of the water and settled in dense solution at the bottom of the bright yellowish acetone. This latter was separated and distilled, and again digested for several days with 10 p. c. of fresh calcium chloride, being frequently well shaken. Again twice separated and distilled from fresh portions of calcium chloride, in a capacious flask with a good Hempel tube filled with small glass marbles, and the whole apparatus filled with well-dried air, and distilled directly into specific gravity bottles, such as are described in the *Ephemeris*, Vol. IV., p. 1448—it gave six fractions, four of which had the specific gravities at $\frac{1}{15}^{\circ}$ C., as follows: First, 0.79662; second, 0.79704; third, 0.79712; sixth, 0.79793. The irregularities of these differences are doubtless due to differences in rate of boiling, yet they demonstrate conclusively that the first fraction can not be anhydrous.

Authorities differ much as to the s. g. of acetone. The lowest noticed is given by W. H. Perkins, Ph.D., F.R.S., in the *Journal of the Chemical Society of London*, 1884, Vol. XLV, p. 478. He gives the s. g. at $\frac{1}{15}^{\circ}$ as 0.79652, and at $\frac{2}{5}^{\circ}$ as 0.78669—and says this is lower than that usually observed, but agrees pretty closely with that of Linnemann, who obtained $\frac{1}{15}^{\circ} = 0.7975$. Thorpe's number, calculated for this temperature, gave $\frac{1}{15}^{\circ} = 0.80244$. Judging from the circumstance that the writer's fractions did not agree, and that therefore there was no constant boiling point to his distillate, and hence no part anhydrous—his and Perkin's results are both too high.

Notwithstanding this, the writer accepts, for the present at least, his own result as a basis for the following specific gravities of dilutions. His best results as obtained by the use of his above-mentioned specific gravity bottles, and a sensitive thermometer in tenths of a degree, recently compared with a standard, are as follows:

At $\frac{4}{10}^{\circ}$ C. 0.808157. At $\frac{1}{15}^{\circ}$ C. 0.796620. At $\frac{2}{5}^{\circ}$ C. 0.786988.

It was first desirable to know whether dilutions of acetone with water were mixtures, or whether, as in the case of alcohol, there was molecular combination with contraction and elevation of temperature. It was found that when 40 Cc. of acetone of about 90 p. c. was mixed with 40 Cc. of water there was a contraction of 3.2 Cc., and an increase of temperature of 5.6° C., with an effervescence of gas as in alcohol.

The proportion of 10 Gm. of recently boiled distilled water added to 90 Gm. of this distillate, mixed by connecting two flasks with the weighed quantities, and passing the liquids back and forth without exposure to external air or loss of vapor, gave the following specific gravities:

Acetone at $\frac{4}{10}^{\circ}$ C. 0.8371. $\frac{1}{15}^{\circ}$ C. 0.8260. $\frac{2}{5}^{\circ}$ C. 0.8168 for 10 p. c. of water or 90 p. c. acetone.

This method of dilution by weighing the acetone and water separately in flasks and then connecting the flasks for mixing without loss of vapor or outer air contact was adopted for the basis of an acetone table. The lines of the table that are given in heavy-faced type are given from actual observation, and the remainder by interpolation.

Acetone = $\text{C}_3\text{H}_6\text{O}$, or Dimethyl Ketone = CH_3COCH_3 is a transparent, colorless, mobile, light, inflammable liquid of an agreeable spirituous or ethereal

odor, with a suggestion of mint, and a sharp, biting taste. The suggestion of mint in the odor varies in strength in different samples, and probably does not belong to acetone, but comes from a minute trace of impurity. It boils at 56.3° C. (Regnault). The s. g. when very nearly anhydrous is at $\frac{4}{4}^{\circ}$ C. 0.808157 at $\frac{15}{5}^{\circ}$ C. 0.796620, at $\frac{25}{5}^{\circ}$ C. 0.786988. It mixes in all proportions with alcohol and water, and is a very general solvent, dissolving many substances that are insoluble in alcohol.

ANTITOXIN.

Under this title there has been developed, during the past year, a substance which, without doubt, will place the human race in a position towards diphtheria, that it already enjoys, with the aid of vaccine virus, towards smallpox.

History.—Like many other discoveries, that of antitoxin has been one of evolution. French writers go back to the year 1888, when Drs. Hericourt and Richet announced that the blood of animals, which had been rendered immune to a poison, possessed the power of destroying or neutralizing that poison.

About four years ago, Dr. Emil Behring, of Halle, announced the discovery of the use of an immunized serum in the prevention and cure of diphtheria. Since that time, experiments have been constantly prosecuted, until, at the present time, the remedy is to be obtained in commerce. Behring has declared that Loeffler's discovery, in 1884, of the diphtheria bacillus was the first chapter in the history of antitoxin.

Dr. Roux, at the Pasteur Institute, Paris, has developed the subject, so far as the French are concerned, although he has said that the credit of first introducing this serum must be awarded to Behring.

Preparation.—The first step towards obtaining antitoxin should be denominated the preparation of *diphtheric toxin*. The latter is prepared by cultivating the diphtheria bacillus, obtained directly from a patient, in flasks of bouillon exposed to the air, at a temperature of 37° C. Usually this operation is allowed to go on for several months, in order to accumulate a quantity of the poison, but, according to Roux, who conducts the cultivation in moist air, it may be accomplished in three weeks.

The resulting solution is next passed through a porcelain filter, which arrests the bacilli and yields a clear, intensely poisonous solution.

The next step is to render the blood of some animal immune to this poison, by injecting subcutaneously small quantities at a time until the desired result is attained. The cow, sheep or goat may be used for this purpose, but, for various reasons, the horse has been selected; he is not so seriously affected by the poison; that is, he does not contract the disease; then he is usually healthy, and will yield a comparatively large quantity of blood at one time.

The treatment of the horse consists in injecting a small quantity of the toxin into the upper part of the neck, beginning with such a small amount as to produce no ill effects. If the solution is too active, its strength may be reduced by exposure, for a few minutes, to a temperature of 65° to 70° C., or it may be treated with a small quantity of solution of iodine in potassium iodide. In the course of a few days, the strength and frequency of the injections are gradually increased, and in a few weeks, the animal is able to bear large doses without injury. When this condition has been reached, the horse is bled to the extent of one to one and one-half litres; as much as ten litres have been drawn from one horse during two days, and the average for each animal varies from twenty-five to fifty litres a month. Dr. Behring has stated that a horse from which he had drawn blood at frequent intervals during four years, remained in good physical condition. After the horse has been immunized, he may be so retained by occasional injections of the toxin. As a rule, twenty days are allowed to elapse after the injection before blood is drawn.

When the blood is withdrawn, it is cooled and allowed to stand until clotting takes place, whereby the fibrin and corpuscles are removed and a clear serum is obtained.

Properties.—This anti-diphtheric serum is what is popularly known as antitoxin. It is a clear, yellowish-colored liquid, and may be concentrated to dryness in a vacuum without undergoing change. It is preserved by drying in this manner, or by the addition of carbolic acid. It is also sometimes preserved by the addition of a small lump of camphor to each bottle of the liquid. The dried antitoxin, when wanted for use, is dissolved in eight or ten parts of water.

Age is said to improve the serum, by lessening its tendency to cause in some patients a slight eruption of the skin.

Administration.—Antitoxin is administered subcutaneously from a

special syringe, which must be of a pattern that will admit of complete sterilization. Most of the serum which is produced has an immunizing power of 1 to 50,000; that is, 1 cubic centimeter of the serum is sufficient for 50 kilogrammes of body weight. The dose is 15 to 20 cubic centimeters, repeated in about 24 hours, the two injections being sufficient for most cases.

The serum employed in America has thus far been almost entirely obtained from Berlin; but several cities in the United States now have horses under treatment, so that the home supply will, no doubt, soon equal the demand.

Wherever the remedy has been used against diphtheria, the percentage of mortality has at once shown a marked decrease, and this has been so universally the case that we are forced to the conclusion that a remedy for this dreaded disease has been found.

LOEFFLER'S TOLUOL SOLUTION. —

Despite the fact that antitoxin is the coming remedy for diphtheria, this solution, proposed by the discoverer of the diphtheria bacillus, is a useful adjunct in the treatment, and is also serviceable in suspicious cases, and in various non-diphtheric inflammations. The formula is as follows:

Menthol	10 grammes.
Toluol sufficient to make	36 c.c.
Alcohol	60 c.c.
Solution of ferric chloride	4 c.c.

The application is made by first cleansing the affected parts with a cotton swab, held by forceps, and then in a similar manner applying the solution with a freshly-saturated cotton swab.

Precautions must be taken against infection from the sudden coughing of the patient, which is liable to occur as a result of the application.

ARGON; A NEW CONSTITUENT OF THE ATMOSPHERE.

At a meeting of the Royal Society, held January 31, 1895, Lord Rayleigh and Professor William Ramsay presented a paper which contained the facts necessary to the establishment of a new element.

It had previously been shown by Lord Rayleigh that nitrogen extracted from chemical compounds was about $\frac{1}{2}$ per cent. lighter than that obtained from the atmosphere. He was led to study the atmospheric gases under a number of different conditions, one of which consisted in submitting a mixture of air and oxygen to the prolonged action of electric sparks; another involved the withdrawal of nitrogen from air by means of red-hot magnesium. In both cases a gas was obtained whose properties could not be reconciled with those of any known element.

To prepare argon on a large scale, air is freed from oxygen by means of red-hot copper. The residue is then passed from a gas holder through a combustion tube, heated in a furnace, and containing copper, in order to remove all traces of oxygen; the issuing gas is then dried by passage over soda-lime and phosphorus pentoxide. It then enters a combustion tube packed tightly with magnesium turnings, and heated to redness in a second furnace.

A single tube of magnesium will absorb from 7 to 8 liters of nitrogen. The temperature must be nearly that of fusion of the glass, and the current of gas must be carefully regulated, else the heat developed by the union of the magnesium with the nitrogen will fuse the tube.

Having collected the residue from 100 to 150 litres of atmospheric nitrogen, which may amount to 4 or 5 litres, it is transferred to a small gas holder and, by means of a species of self-acting Sprengel's pump, the gas is caused to circulate through a series of tubes of copper, copper oxide, soda lime, phosphorus pentoxide and red-hot magnesium turnings, until it is freed from any possible contamination with oxygen, hydrogen, hydrocarbons or nitrogen. It is preserved over mercury, or over water saturated with argon.

The solubility of the gas prepared by means of red-hot magnesium was found to be 4.05 per 100 at 13.9° ; it is, therefore, two and one-half times as soluble as nitrogen and possesses approximately the same solubility as oxygen.

All attempts to combine argon with other elements failed. It was found to be a monatomic gas and, as a monatomic gas can be only an element or a mixture of elements; it follows that argon is not of a compound nature.

From Avogadro's law the density of a gas is half its molecular weight; and, as the density of argon is approximately 20, hence its molecular weight must be 40. But its molecule is identical with its atom; hence its atomic weight or, if it be a mixture, the mean of the atomic weights of that mixture, taken for the proportion in which they are present, must be 40. It was decided to assign to argon the symbol A.

In addition to the foregoing information, Dr. William Crookes read a paper *On the Spectra of Argon*, and Dr. K. Olszewski contributed the results of his experiments on *The Liquefaction and Solidification of Argon*. Two sealed tubes of the new element were exhibited at the meeting and Lord Kelvin, who presided, Dr. Armstrong and Professor Rücker, all expressed themselves as believing that a new element of the atmosphere has been discovered. We are indebted to the *Chemical News*, of February 1st, for the above information.

THE APOCYNACEÆ IN MATERIA MEDICA.~

BY GEORGE M. BERINGER.

(Continued from page 104. Conclusion).

O. Henry and Ollivier, in 1824, first obtained from *Tanghin* a fixed oil, a crystalline substance, very poisonous, and a varnish-like substance which they named *Tanguine*. J. Chatin obtained the crystals in prisms, of which the nature was not determined. In 1889 Arnaud isolated the active principle, *Tanghinine*, in crystals, and presenting the singular property of swelling up with water. It is present in the kernels to the extent of 1 per cent. It is neither an alkaloid nor a glucoside. Arnaud states that the seeds contain an abundant amount of oil, which cannot be obtained by simple expression, as an emulsion is formed with the water. He recommends the extraction with carbon disulphide. J. Chatin concludes, from his experiments with this oil, that it is absolutely inoffensive. Quinquaud observes the great excitability of the medulla by the

poison, and employed it in some toxic paralyses, and likewise in intestinal atony and in incontinence of urine, but the symptoms indicated the danger of toxicity.

THE SEED OF CERBERA MANGHAS.—The *Cerbera Manghas* L. is a tree found in India and nearly all of Oceanica. In the various islands we find numerous varieties based on details of the flowers. The fruit is the size of a hen's egg. In the fresh state it is fleshy, with a fibrous stone, coriaceous and black at maturity, and confining a large oily kernel. According to Horsfield the pulp is employed in Java as a cataplasm in some cutaneous maladies.

The seeds and leaves are considered as very dangerous, and are stated to be drastic purgative and emetic, and too violent for use. The kernels are said to be narcotic, and produce effects comparable with those of *Datura*. M. Jeanneney, by expression, first cold and then with heat, obtained from the kernels 72 per cent. of a limpid golden yellow-colored oil, which burns with a clear flame and an odor resembling that of cocoanut oil. It is very acrid to the taste, producing a sensation of burning in the stomach, vertigo, nausea and violent purgation and colic.

THE SEEDS OF CERBERA ODALLAM.—The *Cerbera Odallam* Gaertn. (*Odallam* Rheede; *Cerbera Manghu* Lin.; *Manghas* Sims not L.; *Tanghima Odallam* G. Don.) is a shrub or tree inhabiting the western coast regions of India. Plugge describes the fruit as a red drupe, spherical or ovoid, the size of an apple, with a stone in the centre surrounded by a mesocarp. The fruit contains generally two hemispherical seeds with a tough, horny, granular envelope. The kernel is rounded on the outside, flattened or depressed about the centre on the internal side. It is formed of two unequal cotyledons, the external surrounding the internal and a short ascending radicle. The seeds of *Cerbera Odallum* contain a colorless crystallizable glucoside *Cerberine* isolated by De Vrij. It is distinct from the *Tanghinine* of Arnaud, of which it is probably an isomer. It yields with dilute acids *Cerberetine* equally toxic and of a handsome yellow color.

The seeds contain 77 per cent. of fixed oil. *Cerberine* is very toxic, and acts by arresting heart action. It presents some of the advantages of *Digitalis*, and merits clinical study. The seeds are employed as an emeto-cathartic, the bark, the latex (rich in caoutchouc) and the leaves as purgatives, but all are dangerous.

BARKS.

NERIUM OLEANDER.—The bark of *Nerium Oleander* L. is the only one of note of this family obtained from Europe. The stem is vaguely triangular or tetragonal, depending whether the leaves are ternate or opposite. The bark is externally yellowish green in the young parts, soon becoming grayish. The internal face is greenish white, the fracture green, the latex originates especially in the internal region of the bark, which is quite thick compared with the wood. The liquid is likewise abundant in the neighborhood of the periphery of the pith, which is large, triangular or square, greenish yellow, with a green line of contact with the wood. The leaves and young stems appear absolutely glabrous. The microscope, however, shows a few hairs, very short and large, unicellular, with a small cavity.

ANATOMY.—The young bark of the stem shows: an *epidermis* with walls externally thickened, soon replaced by a zone of a few suberous layers; a *collenchyma* very clear and quite thick, with elements elongated in the direction of the axis; these contain chlorophyll and starch; a *chlorophyll-bearing tissue* with rounded thin-walled cells containing an abundance of starch. The *Endodermis* is not visible excepting near the summit of the stem. The *pericycle* is thick and contains the bundles of cellular fibres extremely long, pearly white, and with cavities very straight, often flattened; and the cells with a thin membrane with macles of calcium oxalate. The *liber* encloses not macles, but numerous rhomboids, often in longitudinal or radial series. Sometimes a number of crystals are enclosed in a single cell. *Cambium.* *Wood* rich in starch. The *laticiferous vessels* are difficult to see; we find them especially in the pericycle and in the exterior parenchyma.

THE BARK OF THEVETIA NERIIFOLIA Juss. Generally the bark is obtained from the young branches; it is thin, delicate, strongly enrolled upon itself from one or both borders. The surface is gray, greenish or a little yellow, rarely glossy, is finely striated longitudinally, with few whitish streaks, more or less numerous elongated lenticels and scars of the alternate leaves. The internal face is bluish-black or reddish-violet, smooth. The fracture sometimes quite clear, is nearly always lengthily fibrous, with soft fibres in the liber. The length is variable, 15 to 20 c.m.; the thickness 1 m.m. or more; odorless; taste pungent, then strongly bitter.

The *anatomical structure* shows : (1) a suber formed of cells with white flattened walls ; (2) a parenchyma of which the cells are tangentially compressed, the walls colored and with brownish contents ; (3) a zone constituted of numerous white fibres, very long and large, and cavities sometimes quite large and flattened. Beneath this is the liber region, the color analogous to that of the cortical parenchyma, but with the medullary rays. In this tissue are the laticiferous canals filled with a substance at times granular, at other times transparent, little starch, some rhomboids of oxalate. The bark contains the same active principles as the seeds and pseudoin-dican. It is employed as an anti-periodic, febrifuge and purgative. Shortt and Bidie employed it in remittent fever with satisfactory results : a tincture (1 part to 5 of rectified spirit) in doses of 15 to 18 drops during the interval of the attack is recommended.

BARKS OF THE PLUMERIAS.

This genus is represented by tropical trees or shrubs, frequently cultivated as ornamental plants. The medical properties are due to the latex, frequently drastic and corrosive. The barks of several species are employed. The *Plumeria alba* L., a native of the Island Sante Croix, now found in all the warm regions of the Antilles, India, the Mascarene Islands, etc., is known under the French names *Frangipanier blanc*, *Bois de lait*, and the English *Jasmine-tree*. It is the *Topaiba* of the Spanish, and in India is called Arali. It attains a height of 5 to 6 m., and bears alternate leaves and handsome odorous flowers. It contains an abundance of a white poisonous juice.

The bark of this species in commerce is separated from the wood and is in very irregular strips ordinarily curved, rolled up or shrivelled, the length ranging from 10 to 12 c.m. These strips are constituted of an external envelope, papyraceous, cartilaginous, and an internal region tougher and thicker : these two parts are frequently united, but more often, however, detached from each other. The external layer is parchment-like, ranging in color, reddish brown, more or less glossy, or yellow marked with lichens, showing a few whitish streaks and black points, and the leaf scars.

The internal layer attains in old barks 3 m.m., and the internal face more smooth and dark in young barks, is brown and

quite rugose in older barks. It breaks readily, the fracture being short, non-fibrous, except in the inner zoné, and with white points rather regularly marking the brown body. In mass the odor is slightly acid; taste nil near the parchment-like region, feebly pungent and bitter in the bark proper.

The bark is purgative, alterative, depurative, and given especially in blenorragia. It may be administered in a form of decoction or by macerating the powder in sweetened water, wine or beer. The remedy is often associated with other plants (*Aristolochia trilobata*; *Cynosurus sepiarius*, etc). It is also given in herpes, syphilis, and, externally, in lotions upon syphilitic ulcers.

Plumeria rubia L. (*P. flore roseo odoratissimo* Tournef.; *Nerium arboreum* Sloane, etc.), the *Frangipanier rouge* is found in tropical America, Venezuela, Mexico, etc. The bark of the root is generally employed and greatly resembles that of the root of the *P. alba*, and is used in the same maladies as the bark of the latter species.

The *Plumeria phagedenica* Mart. occupies the valleys in Brazil, the indigenous name being *Sebni-iiga*. Heermeyer has described the anatomical structure of the bark (*Pharmaceutische Post*, Sept. 24, 1893). The bark is vermifuge and drastic.

The *Plumeria drastica* Mart. inhabits the Brazilian province Minas-Geraes, where it bears the name *Tiborna*. The bark is employed as a febrifuge, anti-icteric, drastic, etc.

The *Plumeria acutifolia* Poir. (*P. obtusa* Lour. not L.; *P. acuminata* Roxb.) is native of America, but extensively cultivated in the Indies. The bark has been employed against abscess, gonorrhœa and fevers. The juice has been applied to carious teeth, ulcers and wounds, and is rubifacient and anti-rheumatic.

QUEBRACHO.

The name *Quebracho* (pronounced *Québratcho*) is applied in South America, especially in the Argentine Republic, to a number of trees of entirely different families having in common an extreme hardness of the wood and being very rich in tannin. Among these we may mention *Cæsalpinia melanocarpa*, *Québracho rouge* (Leguminosæ); the *Machærium fertile* Grisb., or the *Machærium Tipa* Grisb. (*Tipuana speciosa* Benth.), (Leguminosæ). It may be the *Iodina rhombifolia* Hook et Arn, or *Québracho flojo*, a handsome Santalacæ commonly known as *Sombra del toro*, whose bark is sometimes mixed with that

of the *Q. blanco*. The *Quebracho Colorado* is the wood of a Terebinthaceæ, the *Loxopterygium Lorentzii* Grisb. The *Quebracho Blanco* is an Apocynaceæ, the *Aspidosperma Quebracho* Schlecht (*Macaglia Quebracho* H. Bn.).

The discovery of the tree known as *Quebracho Blanco* is due to Burmeister, who considered the two sorts, white and red, but two varieties differing simply in a few details, among others the color of their wood. Schlechtendal gave to the tree the name *Aspidosperma Quebracho*, but he continued the red sort under the name *A. Quebracho Colorado*. Ten years later, Griesbach recognized in the red *Quebracho* a Terebinthaceæ of the group *Anacardium* and assigned the name *Loxopterygium Lorentzii*, in honor of Professor Lorenz, of Cordoba. Many of the specimens arrived in Europe without specific name or precise information as to botanic origin, leading to serious confusion and diverse results in clinical experiments with this important drug.

All the *Aspidosperma* are from tropical America. The *Quebracho* abounds particularly in the Argentine Republic, and more especially in the district of Catamarca. It extends to the south as far as the north of Patagonia. The *Loxopterygium* seems rather to belong to the province of Corrientes.

The genus *Aspidosperma*, Mart. et Zucc., is formed of shrubs or trees of tropical America with solid wood, leaves ordinarily alternate and with small flowers in cymes, with one or two ligneous dehiscent follicles, and with seeds exalbuminous and winged.

The *Aspidosperma Quebracho* is an evergreen tree with very straight trunk, attaining the dimensions of 15 m. in height and 1.20 metres in diameter. The branches are long and flexible, recurving toward the ground, giving the tree the appearance of a weeping willow. The bark, the wood and the leaves are rich in tannin, bitter and astringent.

The bark of *Quebracho*, as collected, dried and shipped to Europe, appears in thick fragments, little bent, nearly flat, evidently collected for the most part from old plants. One writer says that the trees employed are more than seventy years old. These fragments vary in thickness between $\frac{1}{2}$ and $3\frac{1}{2}$ cc., and with the suber more or less developed.

The exterior face is very rugose, irregularly marked by deep fissures. The color varies, even in the same fragment, from grayish

brown to yellowish-brown, fawn, brick-red, etc., the tint being dull and earthy. The perider, when present, is very tough and frequently bears lichens.

The internal face is finely striated lengthwise, sometimes the striæ are sinuous. The color of this face varies also from a steel gray to a much darker fawn or even distinctly rose.

The transverse fracture is short, strongly granular and very stony; with a lens we see the fascicles of fibres come to the surface in the internal region. The vertical fracture shows these same fibres as small white lines. The taste is bitter but not extremely so.

The most interesting elements in the anatomy of this bark are the curious fibres which it bears in great numbers, but always isolated and embedded in the ordinary parenchyma. The fibres are large, elongated, spindle-shaped; the thickening very considerable in concentric zones and with small clear lumen. Each fibre is surrounded completely by an envelope of small cells forming a single layer, in which each cell contains a large rhombohedral crystal of calcium oxalate.

The chemical composition is extremely complex. The first research was made by G. Fraude, who extracted an alkaloid, *aspidospermine*. Hesse demonstrated the presence of six alkaloids in this bark: *Aspidospermine*, *Aspidospermatine*, *Aspidosamine*, *Hypoquebrachine*, *Quebrachine*, *Quebrachamine*, and a neutral body *Quebrachol*. The *Aspidospermine* of commerce is an indefinite mixture of these various bodies. Tanret thinks that some of these alkaloids are produced in the reactions from the others. He has extracted likewise two new sugars, *quebrachite* and *levogyre inosite*. The bark contains also tannin and starch. According to Huchard the action of *Aspidospermine* appears to be directed especially toward the respiratory centre. It augments the amplitude and then the frequency of the respiration, diminishes and regulates the action of the heart and lowers the temperature. Outside of this action due to the pure *Aspidospermine* all the alkaloids are antithermic, but more especially *Quebrachine*; all color the blood a vinous or currant-red, all cause an increase in salivary, intestinal and renal secretions; all are toxic, especially *Quebrachine* and *Hypoquebrachine*. The least toxic is *Aspidospermine*. They cause death by asphyxia.

Quebracho is employed in its native country as a febrifuge, and according to Schikendanz, the physicians of Tucuman esteem it as

equal to cinchona, but this reputation has not been justified in Europe. As a tonic it is of less value than many European astringents. Its antidyspnœic action renders it especially valuable in asthma, emphysema and even in phthisis.

PAO-PEREIRA.—This drug is the bark of *Geissospermum Vellozii* Fr. Allem. (*Tabernæmontana lævis* Vell., *Vallesia inedita* Guib., *Vallesia punctata* Spreng., *Geissospermum læve* H. Bn.), a tree of tropical Brazil. It is in flat or slightly-curved pieces, 15 to 20 centimetres long, 1 to 5 centimetres broad and 4 to 8 millimetres in thickness. The external surface is reddish-yellow, more or less fissured, and the internal is generally formed of thin papyraceous layers, having a tendency to strip off. The transverse fracture is difficult and unequal. The odor is very slight. Taste extremely bitter. According to Hesse, it contains two principles, the one *Geissospermine* crystalline and the other *Pereirine* amorphous. It is recommended as antithermic, antiperiodic and tonic.

OCHROSIA BORBONICA.—The bark of *Ochrosia borbonica* Gmel. This tree inhabits Reunion, Mauritius, Ceylon, Java, the Mascarenes, etc., and is commonly known as "*Yellow-wood*." The bark is ordinarily in pieces, 4 to 6 cm. long by 2 to 4 cm. wide and 2 mm. in thickness.

The external surface is nearly entirely covered with greenish or grayish lichens, is strongly ridged and brownish in color beneath the lichens. The internal face is red to dark brown, striated longitudinally and with the internal layers only slightly adhering. The fracture is clear on the outside, unequal, but not fibrous on the inner layer. M. Boissard has separated from the yellow-wood a shining white substance, crystallizing in fine needles. This substance, named *Ochrosine*, has been studied by Dr. Vinson, who writes it is tonic and analeptic. The bark is employed among the Mascarenes as tonic, stomachic and febrifuge.

HOLARRHENA AFRICANA.—The bark of *Holarrhena africana* A.DC., appeared in commerce under the name of African quinine bark and erroneously also as conessi bark. This bark is employed in tropical Africa, where it is known as "*Gbomi*," against dysentery. Externally it is brown or blackish gray, suberous and more or less covered with lichens. Internally, fawn or brownish in color, raised in irregular fibrous plates. Fracture coarse, but little fibrous; odor slight and taste bitter.

CONESSI BARK.—Conessi Bark or Tellichery is obtained from *Holarrhena antidysenterica* R.Br. In its native country it has a great reputation and is known there under the name of *Codaga-pala*. The true *Holarrhena* bark is in curved pieces of varying size. Externally it is earthy brown to a light fawn color, irregularly striated with oblique furrows. Internally, the striations are always longitudinal.

The fracture shows an external rose-colored zone, an internal zone with brownish striations. The bark is quite thick. As previously stated it is frequently substituted by products from various species of *Wrightia*, and to this is attributed the unsatisfactory results obtained in Europe. It is largely used in India as a remedy in dysentery. The bark contains the same alkaloid as the seeds, *Wrightine*.

DITA BARK.

Dita or *Alstonia* bark is obtained from *Alstonia*¹ *scholaris*² R.Br., which tree is very common in the forests of India. The remedy was introduced into Europe by Graham, in 1839, and Alexander Gibson, in 1853, contributed an account of the drug. The bark as it enters commerce is in more or less contorted fragments of varying size, and in thickness from 4 to 12 m.m. The external face is frequently marked with blackish lichens and in some fragments the suberous portion is quite thick; the periderm is reddish-brown. Frequently it is marked by large transverse lines and fissures and leaf-scars. The internal face shows a tough grey or brownish-grey zone. The fracture is short, granular, porous but not fibrous and yellowish-white. The microscopic structure shows the suber, (where it remains), formed of cells very regularly piled up in series somewhat tangentially elongated and at times with a reddish-brown contents. Immediately beneath the suber is a layer of small cells, nearly all of which contain a large rhombohedral crystal of oxalate.

¹The genus *Alstonia* was named in honor of Charles Alston, a professor of botany, at Edinburgh, about the middle of the last century. It consists of large trees with verticillate or opposite leaves, calyx without appendages, corolla without crown, stamens included, two carpels containing numerous ovules, two follicles elongated and seeds peltate and are rich in caoutchouc.

²The specific name *scholaris* was applied to this plant, because in the schools of India school-boards are constructed from planks of this tree, the fine grained wood being well adapted for such purposes.

Beneath this the layers of cells pass insensibly into the fundamental parenchyma formed of irregular, sinuated cells, with walls irregularly thickened and elongated in the direction of their axes. The limit of the liber portions is not very distinct. The medullary rays traverse the parenchyma in a sinuous manner and are formed of 2 or 3 rows of cells. The sclerotic elements are numerous and scattered throughout the external parenchyma and disappearing almost entirely in the liber. The laticiferous vessels on transverse section appear like the other cells except for their granular contents; on longitudinal section, they appear large and distinct.

The first analysis of Dita bark appears to have been by Gruppe, who separated a bitter non-crystallizable substance, which he named *Ditaine*. Gorup Besanez, by Stass' method separated this in a crystallized condition. Hesse and Jöbst succeeded in isolating *Ditamine*, an alkaloid, and a closely related body, *Echitamine*. Harnack obtained the *Ditamine* pure by crystallizing from ether under the name of *Ditaine crystallized*, and concluded that this was the only body present. Hesse, as a result of a later complete analysis, described the following constituents, *Echiceric acid*, *Ditamine* (alkaloid), *Ditaine* or *Echitamine* (alkaloid), *Echicaoutchine* (amorphous resin), *Echiretine* (amorphous neutral body), *Echcerine*, *Echitine*, *Echiteine* (non-crystallizable bodies).

Dita bark is greatly employed as an antiperiodic in the countries of its production, where it is even claimed to be superior to quinine and, in a number of intestinal disorders, as diarrhœa and dysentery, it has given good results. It is recommended in debility and such fevers as typhoid and puerperal, and also as a vermifuge. It is a bitter tonic, stimulant and astringent. The powdered bark is administered in doses of .3 gm. to 1 gm., frequently associated with ipecac or gentian. The 10 per cent. tincture is used in doses 1 to 4 gms.

ALSTONIA CONSTRICTA.

The *Alstonia constricta* F. von Mueller (*Tabernaemontana* sp. Mitch.) furnishes the *Queensland Fever-Bark* used to some extent in Europe. The bark in commerce appears to be from branches 10 to 12 cm. in diameter, and is found in curved pieces varying in length from 20 to 30 cm. and about 12 cm. wide. The thickness varies from 7 m.m. to 10 m.m., depending upon the development of the suber. The external face is yellowish-gray, marked by deep fissures. The

internal face is brown, finely striated longitudinally. The fracture is granular, short in the periderm, and although quite fibrous in the internal zone, is easily broken; the color is lighter than that of the faces. The odor is very slight. The taste is strongly bitter, slightly pungent and disagreeable. Hesse has isolated from this bark the following alkaloids, *Alstonine* and *Alstonidine*, and *Porphyrine* and *Porphyrusine* possibly alkaloidal. The analysis of Oberlin and Schlagdenhauffer indicates the presence of the alkaloids *Alstonine* crystallized and *Alstonicine* amorphous.

Hesse attributes to *Alstonidine* properties analogous at once to those of quinine and to nux vomica. The experiments of Bancroft and of Bixby prove that this drug is valuable as a tonic febrifuge and more valuable as a febrifuge than as a tonic, while the *Alstonia scholvis* is more generally employed against dysentery. The *A. constricta* is, however, a good stimulant to the nervous system. As a bitter, it is comparable with gentian. It is ordinarily administered in powder, .5 gm. per day in syrup or in tincture 4 to 8 cc. per day.

ROOTS AND RHIZOMES.

The subterranean organs, with the exception of the Apocynums of America, are relatively unimportant. They are at times swollen and tuberculous, but more often the roots are ligneous and cylindrical. The cortex presents the same general constitution as that of the stem, with usually an abundance of starch and frequently a diminution of the thickened elements (fibres and sclerotics). The oxalate and the laticiferous vessels are less abundant than in the stem. The pith is ordinarily absent.

APOCYNUM CANNABINUM.—The rhizome of the *Apocynum cannabinum* L. is commonly known as the *root* of the Indian hemp of Canada and as Bowman's root, and also as bitter-root. These vulgar names have caused considerable confusion. The plant is a perennial 3 or 4 feet high, branched with slender branches, opposite leaves, greenish-white corolla, follicles hanging, seeds have a tuft of silky white hairs at the summit. If the plant grows in the shade the bark is green; if exposed to the sun it is brown. The Indians employed it for binding on account of its fibrous nature, and hence the name Indian hemp.

The rhizome is in the fresh state 8 to 18 m.m. in diameter and frequently branched, and is quite soft. The bark is quite thick and

clearly distinct from the wood. The horizontal portion is devoid of pith; the other portion possesses a pith more or less developed and rich in latex. If collected in the spring the pith is absorbed, leaving a cavity. It is usually collected in the fall and cut in fragments, and in drying becomes hard, brittle and transversely fissured.

Schmiedeberg has separated two bodies having a cardiac action, similar to *Digitalis* and to *Strophanthus*; *Apocynine-resin* and *Apocyneine* a glucoside. To this drug are ascribed diuretic, diaphoretic, emetic, cathartic and expectorant properties.

APOCYNUM ANDROSÆMIFOLIUM L.—This plant has also a number of common names, some of which are identical with those applied to the *A. cannabinum*; such as Indian hemp, bitter-root, dogs-bane, milk-weed, etc. It inhabits generally the same region as the latter and in commerce the rhizomes of the two are frequently mixed under the name of *A. cannabinum*. The rhizome is of a reddish color, and more contorted and generally longer and less bitter in taste than the latter. The anatomical structure shows no distinguishing characters between the two species, and their properties appear identical.

JALAPA.—The root of the *Echites longiflora* Desf., inhabiting portions of Brazil, Uruguay and the Argentine Republic is said to be purgative, and likewise the leaves. Anatomically the root is remarkable for the regularity of the arrangement of the elements of the wood and bark in radial rows. The names *Jalapa*, *Yalapa* and *Yalapina* are applied in the Argentine Republic to the roots of a number of species of *Echites*.

THE MADAGASCAR PERIWINKLE.—The root of the *Vinca rosea* L. is yellowish, quite small and thin, with a relatively thick bark and yellowish wood, and with numerous rootlets. The leaves and roots are both credited with depurative, antiherpetic and vulnerative properties.

NERIUM ODORUM.—The *Nerium odorum* Solander, considered by many authors as a species, is probably only a form of *N. Oleander*. It inhabits the western base of the Himalaya mountains extending thence to the eastern part of Persia. The root is considered the most active part, but the bark, stems and leaves are also used. The root is somewhat twisted 15 to 20 c.m. in length, and 5 to 15 m.m. in diameter. The surface is reddish-fawn colored in places, longitudinally ridged with short nearly smooth striations; few rootlets;

bark relatively very thin, frequently separated from the wood and formed of two zones.

Greenish has isolated from the roots of *N. odorum* two glucosides *Neriodorine* analogous to *Oleandrine* and *Neriodoreine* analogous with *Digitaleine*: the two principles are bitter and poisonous. In India, a decoction of the stems in oil is applied externally against leprosy and other cutaneous affections, and the fresh juice in ophthalmies. The juice is said to be strongly irritant, and caustic and very poisonous and used for poisonings and suicide.

OPHIOXYLON SERPENTINUM.—The root of the *O. serpentinum* Willd., the *Rauwolfia serpentina* Benth., is described as quite large $\frac{1}{2}$ to 2 c.m. in diameter recurved, sinuate, tapering to the extremity and light brown in color. The section shows a ligneous axis yellowish white and hard, and a thin brown cortex. The odor is slight, taste strongly bitter, disagreeable, alliaceous and nauseous. The cortical parenchyma is filled with starch and the laticiferous ducts contained are filled with a brown substance. According to the investigations of Prof. Wefers Bettnick the root contains a resin, a volatile oil, tannin and a yellow crystalline substance *Ophioxylin*.¹

The specific name indicates the use to which it is applied in India against snake bites and the sting of the scorpion, being employed internally in decoction and externally in powder. It is largely used as a bitter febrifuge and extensively in febrile intestinal affections: cholera, dysentery, etc. It is also recommended as an anthelmintic and as augmenting uterine contractions in labor.

¹ The authors of the *Pharmacographia Indica* report examining this root and finding traces of alkaloid present in extracts made with petroleum ether, ether, alcohol and amylic alcohol, and state as follows:

"At present we do not offer any opinion as to whether the alkaloidal principles we have referred to in the various extracts are identical or not; we are also at present unable to state whether these alkaloids are new or merely principles which have already been described as occurring in other plants of the same natural order. An analysis of the root of *O. serpentinum*, by W. Bettnick, has been published, where no alkaloid is reported to have been found, but a crystalline body related to juglone. We feel convinced that the drug examined by Bettnick was not authenticated. Prof. Eykman has recorded the discovery of an alkaloid in an Indian species *ophioxylene*, and later still (1890) M. Greshoff has found an alkaloid giving a veratrine reaction with Frohde's reagent, thus substantiating our analysis. It is probable that as the root resembles plumbago root, Prof. Bettnick's *ophioxylin* was only *plumbagin*."

WOODS.

The wood of a number of species of apocynaceæ is useful both in medicine and in industrial operations. Those of Africa and neighboring islands appear to be the most important.

STEM OF THE GUACHAMACA.—The *Malouetia nitida* Spruce, *Guachamaca toxifera* Grosourdy is a small tree inhabiting Venezuela. On incision there exudes from the cortex a white latex. The bark is the most active organ, but generally the entire branch is used. Externally it is reddish-gray, ridged longitudinally and marked by leaf scars. The bark is thin reddish, wood is reddish in concentric zones; pith is small and brown. Taste is a little acrid, slightly astringent and not bitter. The cortical parenchyma is rich in resin and contains numerous groups of sclerotic elements.

Guachamanine separated by Schiffer appears to approach *curare* but in action has not been sufficiently studied.

QUEBRACHO.—The wood of the *Aspidosperma quebracho* is extensively used in South America in various industries. It was exhibited for the first time in Europe at the Vienna Exposition in 1873, and again at Paris in 1878. The name *quebracho blanco* is in allusion to the color of the wood and not to the bark. The wood contains but little tannin, and will not answer for the purpose of tanning, but is highly prized by the wheelwright and carpenter.

Aspidosperma excelsa Benth, a tree of British Guiana known as "*Yaruri*," has a light, elastic and solid wood, which is greatly used for the construction of oars.

Aspidosperma sessiflorum, Fr. Allem.—This wood is esteemed for building and carpenter-work in Brazil. The juice which exudes from incisions in the bark in drops, is caustic and bitter, and is probably very toxic. It is one of the *satin woods*. A number of trees which in the Brazilian provinces are known under the names of *Peroba* or *Paroba*, are probably obtained from other members of the genus *Aspidosperma*. Brazil appears to be very rich in these species, 39 being described. From the vulgar names it is very difficult to determine the species.

OUABAIA.—This arrow poison of the Somali tribe of Africa is prepared from the wood of an Apocynaceæ. The history of this substance is entirely recent. In 1882, De Rochebrune and Arnaud examined this drug, but their investigations were interrupted by lack of material. In 1888, Arnaud isolated from

the wood brought from Oriental Africa by Revoil, a crystallized glucoside, *Ouabaine*, and which was proved by Gley to be a heart tonic. Poisson studied the botany of the plant, and showed its resemblance to *Carissa Schimperi*, A.DC., and in the absence of flowers and fruit, classed it provisionally in the genus *Acokanthera* which G. Don in 1838 had separated from *Carissa* on account of the absence of spines. The plant being named *Acokanthera Ouabaïa*, Poiss. In 1889, Cathelinau, as a result of microscopic study, concluded that the genus *Acokanthera* agreed with *Carissa*, with but one single exception. Bentham and Hooker likewise considered these two genera as differing but very little, and Dyer thinks they should be reunited. Franchet also identifies the *Carissa ouabaïa*, with the *C. Schimperi*, A.DC., a species found in Zanzibar, among the Somali and in Abyssinia. Finally, M. Max Cornu reunites the plant with the *Arduina*, under the name of *A. Ouabaïa*, M. Cornu.

More recently Lewin has investigated the subject and distinguishes true *Carissa*, while being bitter and containing a glucoside, as inoffensive, while the true *Acokanthera* are toxic. To the three species *A. Ouabaïa*, *A. Schimperi*, *A. Deflersii*, has been successively attributed the veritable *Ouabaïa*.

Acokanthera Ouabaïa, Poiss., known under the vernacular names of *Wabei*, *Wabajo*, *Ghedulajo*, according to Schweinfurth, is the accepted species. D. Hanbury and Holmes consider it identical with the *A. Schimperi*. It is a tree attaining a height of 5 metres and inhabiting that portion of the Somali country 1,000 to 1,200 metres in altitude. Schweinfurth states that the leaves of the plant are much thicker than those of *A. Schimperi*, and have three lateral nerves instead of four or five, and are of brown color.

A. Schimperi B et H. (*Strychnos abyssinica* Hochst.; *Carissa Mpte* Hochst.; *C. abyssinica* R. Br.; *C. Schimperi* A. DC.) the "Mptah," "Mupta," "Maktat," "Mepti," "Menbtchen," etc., occupies a large surface of oriental Africa to about 1,800 metres altitude. The leaves are entirely glabrous, shining, and flowers without odor, often rose-colored.

A. Deflersii Schw. This species inhabits the region in Africa around the Red Sea, and extends throughout Yemen in Asia at an altitude of 600 to 1,000 metres. According to Schweinfurth the leaves are rough in the lower surface, especially the midvein and the flowers are larger and pure white. In these three species the wood appears to be identical.

The drug is constituted of fragments of wood obtained from the stem, but the root is equally active. They attain 3 to 5 c.m. in diameter. The bark is 1 to 1.5 mm. thick, greyish yellow in color with silvery appearance in spots. It adheres closely to the wood, but the suber can be easily scratched off. Externally it is longitudinally ridged and somewhat scaly. The fracture is brownish, taste is peculiar and persistent.

The wood is very hard and compact, yielding a clear, bright section without pores; the concentric zones scarcely visible; the pith is very small quadrangular and eccentric. The color is a pale yellow and clear on fresh section, deeper ochre-yellow on old surfaces, and quite dense, odorless and having very little taste. Ligneous fibres very abundant; the vessels are relatively few in number and quite small. The medullary rays consist of one or two rows of cells which frequently contain crystals of calcium oxalate. The decoction of the wood yields a green coloration after twelve to forty-eight hours, which lasts for several days. A green fluorescence is also produced by sulphuric acid in either solutions of *ouabaine* or in decoctions of the wood.

Arnaud, in 1888, separated a white crystallized glucoside, the *Ouabaine*, which is inodorous and not bitter, or but very slightly so in comparison with the wood. Its formula differs from that of *Strophanthine* by CH_2 . It has been found by the same chemist in the *Strophanthus glaber* of Gaboon. The wood and the root contain about 3 parts in 1,000.

Lewin has separated from *A. Schimperi* A. DC. a product different from the *Ouabaine* of Arnaud, which he named *amorphous Ouabaine*. He likewise separated an oily substance readily solidified *Carissol*. From the bark he separated impure *Ouabaine*, and a very bitter, non-poisonous substance *Carissine*.

The toxicity of the wood of the *Ouabaia* is demonstrated by usage to be the same as that of the arrow poison. For the latter purpose the aqueous extract is made into balls, and a small amount is spread on the extremity of the arrows; 5 to 10 m.gm. being sufficient to kill a rabbit. The physiological action seems to be similar to that of *Strophanthine*, only many times stronger. On the conjunctiva of animals it produces anæsthesia, but according to Panas it is inactive upon the human. According to Lewin this anæsthesia of the cornea is much slower but more perfect and durable than

that of cocaine. The *Amorphous Ouabaine* is toxic in the dose of 2 m.gm. per kilo in the rabbit, and 3 to 5 m.gm. in the pigeon. *Carissol* is said likewise to be toxic.

The extremely small dose allowable renders the employment of *Ouabaine* in medicine very difficult. Its use at present appears to be restricted to the treatment of whooping cough. The dose is one to two-tenths of a milligramme.

CARISSA XYLOPICRON Dup.-Th. The *Carissa coriacea*, Wall.; the Bitter-Wood of Bourbon, *Bois d' absinthe*. The wood appears in the market in pieces with or without the bark, and is used in cups, etc., the same as the wood of *Picræna excelsa* or the *Ochrosia borbonica*. The wood is of an orange or yellowish-white color, odorless, very bitter and a persistent aftertaste, and colors the saliva yellow. It has a reputation as a bitter tonic, febrifuge and stomachic and also as a vermifuge.

HERBS AND LEAVES.

LEAVES OF THE ROSE LAUREL.—These leaves are at times opposite, but the more frequently verticillate in threes about the young branches. They are rigid, tough and coriaceous, on short petioles. They are lengthily lanceolate, margins entire, attenuated at both extremities, the point acute. The upper face is a deep green, dull; the lower surface is somewhat brighter. The midvein is prominent with numerous very fine secondary veins. The leaves are quite acrid and bitter.

According to Schmiedeberg they contain three glucosides, *Nerein* which he considered identical with *Digitalein*; *Neriantin* and *Oleandrin*. The therapeutic action appears to be that of a heart tonic and more distinctly diuretic than *Digitalis* without accumulation, and is likewise said to be useful in dyspnœa, œdema and palpitations. It is likewise frequently used in certain cutaneous affections as an antipsoric and parasiticide.

PERIWINKLES.—The various species of *Vinca* that are recognized as interesting medicinally are *Vinca minor* L, *V. major* L., *V. media* Link et Hoffm., *V. acutiflora* Bertol., *V. herbacea* Waldst et Kit. These may be substituted one for the other without any great disadvantage, but the two first mentioned are the most important. They are said to be bitter and astringent and serviceable as vulneraries and are slightly laxative. They have also been recommended in leucorrhœa. No active principle has yet been isolated.

ALLAMANDA CATHARTICA L., all the Allamanda are energetic evacnants. The *A. cathartica* is a native of Guiana, where the leaves are commonly employed as a purgative. The *A. Schottii* Pohl. of Brazil has similar properties.

ECHITES SUBERECTA Jacq.—A plant of the West Indies, especially Jamaica, and introduced into the Bahamas. Bowrey has analyzed the plant and isolated *Urechitine* a very toxic, crystalline glucoside; *Urechitoxine*, likewise a toxic glucoside, acrid and crystalline or amorphous. These two bodies are extremely active cardiac poisons and their therapeutic application does not appear permissible. The plant is stated to be used for criminal poisonings by the negroes.

The leaves of the *Echites biflora* Jacq. of Central America and the Antilles is stated to be purgative and applied topically to scrofulous ulcers. The leaves of *Echites longiflora* Desf, of the Argentine Republic are strongly purgative and in infusion are employed against hæmorrhoids and used also in cataplasms.

ASPIDOSPERMA QUEBRACHO Schlecht.—The leaves of this tree are verticillate in threes, deep green, lanceolate, subsessile, coriaceous, smooth and terminated as in many of the species of this genus by a sharp point. They are said to contain 27.5 per cent. of tannin and to be employed in the industries.

GEISSOSPERMUM VELLOSI Fr. Allem.—The leaves of this plant are extremely bitter. They contain *Pereirine*, but in less quantity than the bark and seem to be but little used. They are lanceolate, attenuated at the base and short petiolate and prolonged into a long point at the summit; borders undulate, entire; the surface smooth and shining; greenish or brownish, brighter but less glossy beneath.

CAOUTCHOUCS AND GUTTAS.

The products formed by coagulation of the latex of the apocynaceæ nearly all *caoutchoucs*, but some are true *guttas*.* The number of apocynaceæ containing caoutchouc is considerable, but only in com-

* Caoutchouc and Gutta Percha are two substances very similar, differing only in a few points. At the ordinary temperature Caoutchouc is elastic, Gutta is solid. On warming, the caoutchouc becomes adhesive, but remains elastic; the gutta becomes malleable and plastic, but not elastic. With prolonged action of heat and air caoutchouc is transformed to a sort of pitch, gutta becomes brittle and resinous. Ether readily dissolves caoutchouc, and is a poor solvent for gutta; with oil of turpentine the solvent action is reversed. Sulphur combines readily with caoutchouc and but poorly with gutta.

paratively few are the products utilized or of commercial importance. They are, for the most part, obtained from the stems of climbing plants. The solidification is sometimes allowed to take place naturally, but generally by concentrating by exposure to the sun or by fire. Rapid coagulation has the advantage of preventing from the beginning injurious fermentation, which develops disagreeable odors in the caoutchouc and alterations, and yields a product harder, more dense and containing less water. Coagulation can also be produced by chemical means, as by acids (sulphuric, nitric, tartaric or lemon juice, etc.) or by sodium chloride, sea-water, alum, etc. Coagulation by heat is usually preferred, and during the operation it is necessary to strongly compress the product.

For the most part the American caoutchoucs are excellent for industrial purposes ; their resistance, their toughness and their considerable hardness is much appreciated, and equatorial America furnishes alone the best caoutchouc for all the rest of the world.

All the caoutchoucs of Mexico, Central America, Columbia Guiana, Ecuador, and likewise a large part of that from Brazil, are exclusively furnished by Euphorbiceæ (*Hevea*, *Siphonia*, etc.) or by Urticaceæ (*Castilloa*, *Cecropia*, etc.) The *Hancornia speciosa*. Gomez is, with one or two closely allied species, the principal caoutchouc yielding Apocynaceæ of America. It yields the varieties known as *Pernambuco caoutchouc*, *Maranham Caoutchouc*, and *Bahia Caouthouc*. The first appears in plates varying in thickness from 0.5 to 7 c.m., of a rose color and an efflorescence of alum on the surface. Its quality is very inferior to that of Para or of the Malay caoutchoucs. The Maranham Caoutchouc is deeper in color, like wine-lees, with brown marbling. The surface is smooth, non-efflorescent, harder and less porous, and contains less water. It is probably coagulated by sulphuric acid. The Bahia Caoutchouc is said to be produced from the variety *minor* of *Hancornia*. It is rare and of but little value, possessing none of the excellent qualities. It contains much water and foreign substance and a certain quantity of non-solidified latex. It is in masses or large plates, rose-colored, and is probably prepared by spontaneous coagulation.

The caoutchoucs of Africa are furnished almost exclusively by two genera of Apocynaceæ, the *Vahea* and the *Landolfia*, which many botanists consider under one genus. A few *Ficus* and some *Asclepiadeæ* may produce a little of the gum elastic, but generally

this is not appreciable and the true caoutchoucs of Africa are furnished by these Apocynaceæ. The *Vahea tomentosa* Leprieur, furnishes a large proportion of the Senegal caoutchouc. The *V. Senegalensis* A. DC. likewise is said to yield a large quantity. These lianes are of small diameter and greatly entangled and the most usual method of collection is to cut them and collect the juice, which flows very rapidly. Each plant yields 3 to 4 kilos of caoutchouc. The solidification is accomplished by water containing acids or salt in solution. In the interior of the continent, the coagulation seems to be accomplished by sun heat and the product made into balls with ashes. This caoutchouc enters commerce generally in plates weighing 130 to 150 gm. blackish externally, and grayish within and containing a large proportion of water, or in balls, more highly esteemed and freer from impurities, varying from 8 to 60 gm. and united in groups of from 15 to 20, and these are of a rose color.

The *Landolfia Heudelotii* A. DC. and the *L. Owariensis* Pal. de Beauv., are important as caoutchouc producing plants. They inhabit the western side of tropical Africa and the latter plant is said especially to produce the caoutchouc from Sierra-Leone, which appears in balls, mostly of a slate color internally. The *Landolfia florida* Benth, occupies an altitude of 2,500 feet and is found also in Mozambique and is the source of a large amount of caoutchouc. The caoutchouc of Gaboon is undoubtedly derived from the two last-named plants. It appears in masses, white upon cutting, quite consistent, containing much water and but little foreign matters. It is readily purified and then remains firm and resistant. It is estimated that from the French colonies there is annually exported 400 tons. The *Landolfia Kirkii* occupies the oriental regions of Africa, especially Zanzibar and Mozambique, being the "Matire" or "Mtiri" of the natives. It is the most important species of this region and its latex solidifies spontaneously so readily that artificial coagulation is unnecessary. The exportation of this product in 1879 was valued at 1,125,000 francs. The *L. Petersiana* inhabiting the same region is characterized by an extremely fluid latex, the coagulation being secured by acids or by fire.

The caoutchoucs of Madagascar are furnished by *Vahea madagascariensis* Boj. *V. gummifera* Lamk, and *V. Comorensis* Boj.; and are coagulated by acids, lemon juice being mostly used.

In India several species of *Willughbeia* are said to yield caoutchoucs. The *Alstonia scholaris*, the source of Dita bark, is said to yield a gutta of poor quality. In the region of Indo-China a number of species yield caoutchoucs generally of little value.

The only *Apocynaceæ* of Oceanica important in this respect is the *Urceola elastica* Roxb. This plant and the Asclepiad, *Calotropis gigantea* furnish nearly all of the caoutchouc of Borneo and is likewise known as white Assam caoutchouc. The *Urceola* is a tree about 10 c.m. in diameter and the latex is extracted by making a V-shaped incision as far as the cambium.

PINEAPPLE CULTIVATION IN THE INTERIOR OF FLORIDA.

The question is frequently asked us : "Can pineapples be successfully grown in Lake County?" We unhesitatingly answer, they can. Many are grown, but generally in small patches, here and there, of which little is known except to the individual growers ; yet sufficient to demonstrate the adaptability of our soil, and showing that with the same treatment they require elsewhere success is equally certain. We give below a few facts concerning the plant and the mode of culture in the interior of the State.

Although the lower Indian River and Lake Worth region is the great pineapple district of Florida, yet there are other portions of the State where much attention is now being given to pineapple culture. In the vicinity of Orlando the industry has probably made the greatest advancement, although possessing no greater natural advantages than many other portions of South Florida. The best results are reached in this region by growing the plants under a grating cover, which affords protection from occasional frosts and strong winds, and shuts out some of the summer sunshine. The cover is made of narrow boards placed a few inches apart on stringers and supported by posts at an elevation sufficient to allow persons to walk upright under it. The sides of the sheds on the north and west are weather-boarded in order to further protect the plants from cold winds. The cost of such sheds varies from \$300 to \$500 per acre.

Near Orlando there are three large pineries—Russell's Fairview and Modela Park. The latter is the largest covered pineapple field in Florida, and probably the largest in the world. It contains six acres and about 60,000 plants.

Pineapples grown under cover average much larger in size and have a better flavor than those grown in plantations, and hence command a better price. They generally net the shipper from 15 to 30 cents each. Six thousand apples sold from the Fairview pinery last year brought \$1,200. The suckers, however, produced by this pinery, which are in great demand for planting, were much more profitable, nearly \$8,000 having been realized from their sale.

While the pineapple ripening season in the Indian River region is from April to September, in interior Florida it is not strictly confined to these months, as,

under cover, the flowering, and hence the fruiting of the plant, can be to some extent controlled. There is hardly a month in the year when ripe apples cannot be picked from the covered pineries. Grounds bordering lakes are favorite pinery sites. The plant requires frequent fertilizing to insure good and large fruit. Cotton seed meal is considered one of the best fertilizers for pineapple plants.

A few facts concerning the pineapple plant botanically considered may add interest to this article. Not many years ago many people who had not studied the subject thought that it was a parasite growing on pine trees, and that the fruit was grown in its aerial position. This idea may be accounted for by the fact that the fruit resembles the pine cone (it was so named from this resemblance), that the pineapple belongs to the botanical family, Bromeliaceae, of which the long moss is a member, and that botanists say that all plants of this family are capable of "living on air alone." The pineapple plant has long, serrated, sharp-pointed rigid leaves, springing from the root of the plant, and from the centre of the leaf cluster a short flower stalk growth, bearing a single spike of flowers and a single fruit. In the development of the fruit each flower and the bract accompanying it become thickened and fleshy, and this causes a crowding or growing together of the mass forming a single fruit covered with berry-like projections—the withered tips of the remaining petals. It is these petal tips that give the fruit the appearance of being covered with eyes. The plant grows to the height of from three to five feet.

CALCIUM PHOSPHOGLYCERATE.

This compound has attracted considerable attention in France; a formula for its preparation was given in this journal, 1894, p. 383.

A number of forms for its administration have been suggested, of which the following appear to have the preference:

Solution of Calcium Phosphoglycerate.

Calcium phosphoglycerate	10 grammes.
Distilled water sufficient to make	1,000 cc.
Dissolve and filter.	

The solution is not entirely clear, but may be made so by the addition of a trace of citric acid.

Syrup of Calcium Phosphoglycerate.

Calcium phosphoglycerate	10 grammes.
Citric acid	1 gramme.
Granulated sugar	610 grammes.
Water	340 "

The salt and acid are dissolved in the water, the sugar is added and dissolved without heat; the product weighs about 950 grammes, which may be brought to the weight of 1,000 grammes by the addition of syrup of orange.

EDITORIAL.

THE SUPPRESSION OF THE NOSTRUM TRAFFIC.

The editor of the *Medical News* (February 9, 1895) comments as follows :

In contrast with the efforts on the part of some members of the American Medical Association, as representative of the medical profession, to exorcise certain salutary restrictions from the code of ethics, are the numerous indications of a disposition on the part of the dental profession to elevate its standard both ethically and educationally. While certain men in the medical profession look upon nostrums with indifference, if not with encouragement, the dentists are discussing measures for the suppression of unethical practices of all kinds.

The foregoing remarks refer to the indiscriminate use of various cocaine preparations for the relief of diseases of the teeth and gums, the manufacturers claiming in most cases that the preparations are harmless.

It is suggested that dentists and physicians might well join hands in an effort to enact and enforce salutary legislation.

As pharmacists, let us ask ourselves how we stand in this matter. Are we endeavoring to get out of this slough, or are we to remain the tool of the nostrum manufacturer?

SERUM THERAPY.

This is a subject which, sooner or later, is bound to effect every pharmacist, but whether it will interest him pecuniarily or not cannot at present be determined. He must either furnish the various substances used in this form of medication, or lose his prestige as a purveyor of remedies. The present indications are that the various serums will be sold in original packages, in which case probably no skill will be required to dispense them, and we may see them offered for sale, very much as patent medicines are now, by any one who chooses to sell them ; or, as is usually the case with vaccine virus, the physician may prefer to supply himself directly from the manufacturer, in which event it may be safely predicted that the latter will offer every inducement.

That pharmacist who has a knowledge of bacteriology will be in a better position to intelligently judge such serums as may be required of him, than his less fortunate brother who has no knowledge of the use or value of his remedies.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

BULLETIN VOL. II, No. 2. College of Agriculture, Imperial University of Japan.

No. 1 of this bulletin was noticed in this JOURNAL (1894, p. 412), and the leading article in this number is the continuation of the subject, "The Energy of Living Protoplasm," by Dr. Oscar Loew. The author presents some interesting theories concerning the formation of proteids in plant cells, he adds many facts in support of his theory of active albumen, and thinks this theory has reached the stage when men say there may be something in it.

The other papers in this number are : "On the Vegetable Cheese, Natto," and "On the Poisonous Action of the Hydroxyl-derivations of Benzol upon Yeast and Bacteria," by K. Yabe ; "On the Quantity of Wood-gum (*xylan*) Contained in Different Kinds of Wood," by J. Okumura ; "On the Reserve Protein in Plants," by G. Daikuhara ; "On the Occurrence of Mucin in

Plants," and "Mannane as a Reserve Material in the Seeds of *Diospyros Kaki*, L.," by J. Ishii; "Mannane as an Article of Human Food," by C. Isuji.

LES TABACS ET TOUBEKIS GRECS. RAPPORT PRÉSENTÉ AU CONGRÈS INTERNATIONAL DE CHÉMIE APPLIQUÉE (BRUXELLES 4-10 AOUT 1894.) Par A. K. Dambergis. Athens, 1894.

The foregoing report to the International Congress of Technical Chemists held at Brussels, August, 1894, treats of Grecian tobacco from a chemical standpoint. We find that Greece is, to a certain extent, a producer of tobacco for many of the other European countries, the exports in 1893 amounting to 2,597,740 kilos. The results of the chemical analyses of the tobacco from the various Grecian provinces are tabulated in an instructive manner.

THE PHARMACOLOGY OF COLA ACUMINATA. Third edition of Parke, Davis & Co.'s "Working Bulletin," on the subject of Kola. One object of this bulletin is to show that Kola is by no means a new remedy. It contains two well-executed colored plates and much valuable information, but we are still looking for something more recent, concerning the chemical constituents and therapeutic action of this drug, than the monograph of Heckel and Schlagdenhauffen.

SWEET CASSAVA; ITS CULTURE, PROPERTIES AND USES. By Harvey W. Wiley, Chemist of the U. S. Department of Agriculture, Bulletin No. 44.

OBITUARY NOTICE OF JOHN M. MAISCH. By Charles S. Dolley, M.D. Read before the American Philosophical Society, December 7, 1894. This contribution is especially valuable, as it gives a complete list of Professor Maisch's contributions to science. They number over 250, and extend from the year 1854 to within a few months of his death.

UEBER EINIGE FLECHTENSTOFFE; NOTIZ ÜBER CHRYSOPHANSÄURE; AND NOTIZ ÜBER DIE PEREIRORINDE VON O. HESSE. Reprints from *Liebig's Annalen*.

RESOLUTIONS adopted by the closing meeting of the VIII International Congress of Hygiene and Demography, held at Budapest, September 9, 1894.

THE SHAW GAS TESTER FOR DETECTING THE PRESENCE AND PERCENTAGE OF FIRE DAMP AND CHOKE DAMP IN COAL MINES, ETC. By Joseph R. Wilson. A paper read before the Federated Institution of Mining Engineers at the Annual General Meeting, Newcastle-on-Tyne, September 5, 1894.

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA. Containing the papers read before the College from January, 1894, to December, 1894, inclusive. Philadelphia. 1894.

BOYD'S BUSINESS DIRECTORY OF PHILADELPHIA FOR 1895. Published by C. E. Howe & Co., southwest corner Eighth and Locust Streets, Philadelphia.

THE CALENDAR OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

WARNER'S THERAPEUTIC READY REFERENCE BOOK FOR PHYSICIANS. Philadelphia. W. R. Warner & Co. 1895.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, February 19, 1895.

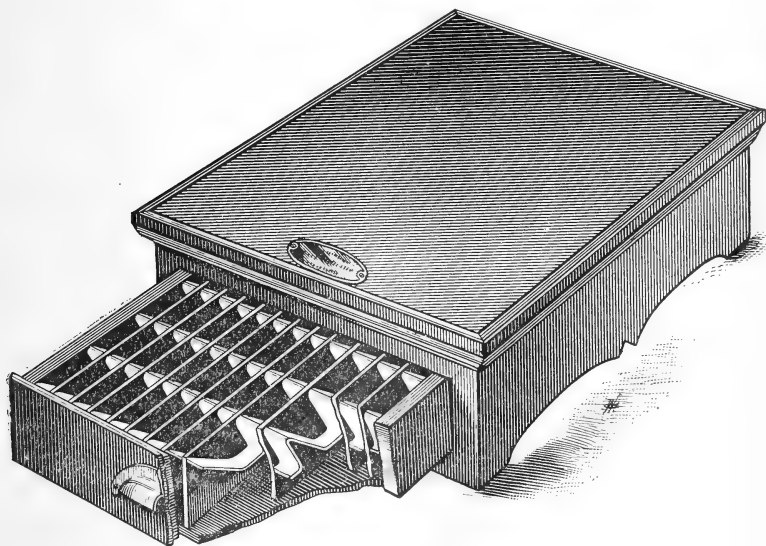
The meeting was called to order by appointing Prof. F. G. Ryan Chairman. On motion the reading of the minutes was dispensed with.

The Registrar announced that there had been received as donations since the last meeting the following works:

Les Drogues Simples d'Origine Végétale, by MM. Planchon and Collin. From Octave Doin.

Bastin's Laboratory Exercises. From W. B. Saunders.

Extent and Character of Food and Drug Adulterations. *Proceedings of the Eleventh Annual Convention of the Association of Official Agricultural Chemists*. U. S. Department of Agriculture.



U. S. Consular Reports for 1894.

U. S. Civil Service Commission. Tenth Annual Report.

U. S. Bureau of Education.

Mr. L. F. Kebler read some notes on beeswax and various adulterations; conspicuous among the variations are those of the specific gravity and acid numbers; the principal contaminations being paraffin and earthy materials, the latter to make its specific gravity nearer to normal. When paraffin is used to any large extent, the surface of the mixture will always show a concavity of marked character.

Petrolatum was also reported on and he had examined nine samples, but one of them was closely within the requirements of the Pharmacopœia. Where vegetable or organic matter was the contaminant, the French chemists relied upon a saturated solution of permanganate of potassium, used in the proportion

of 5 drops of the solution to 5 grammes of the suspected article; they should be thoroughly triturated in a glass or porcelain mortar; if the petrolatum is uncontaminated with organic matter the color remains as normal, but in the presence of organic matter it turns chestnut-brown.

Rock candy syrup was also reported on. This is generally thought to be the residue from the manufacture of rock candy, evaporated to a proper consistence. Samples that had been examined showed considerable variation, some containing notable amounts of uncrystallizable sugar. Some manufacturers make it from granulated sugar by solution in water and bringing it to the specific gravity of 1.32. One manufacturer claimed that he used 1 ounce of salicylic acid in 500 gallons of syrup.

A label cabinet of neat and thorough workmanship was exhibited. The design, as shown by the accompanying figure, is novel and well calculated to answer the object for which it was designed; the drawer is divided from front to back with strips of wood, making spaces slightly wider than the labels. A ribbon of nickel-plated metal, the exact width of the divisions, is secured to the front of the drawer and made into curves slanting from the top of the front of the drawer all the way to the back, so that the labels lie at an angle of nearly 45° to the bottom of the drawer. This enables one to take any label out of its appropriate place with great ease. Screws are arranged by which any shrinkage of the wood may be taken up very readily and exactly.

The question of methods to prevent accidents in dispensing prescriptions was brought up for discussion. The general opinion was that no mechanical contrivance could be relied on to prevent mistakes. Constant vigilance is the only method to avoid errors.

Dr. Miller said it was his rule to insist upon the patient's name being placed upon the prescriptions, and if for external use it be also indicated in the directions to be placed on the label.

There being no further business, on motion adjourned.

T. S. WEIGAND, *Registrar*.

NOTES.

C. Uffelmann and A. Börner (*Zeit. für angewand. Chemie*, **23**, 710, through *Analyst*, **20**, 42) have analyzed ten samples of Kola nut, varying in price from \$1 to \$5 per pound, with the following average results:

	Per Cent.
Water	13.35
Total nitrogen	1.53
Caffeine (including theobromine)	2.08
Ethereal extract	1.35
Starch	45.44
Tannin	3.79
Cellulose	7.01
Other non-nitrogenous matter	18.21
Mineral matter	2.90

In spite of the great difference in price, the different specimens showed a great similarity in composition.



VERATRUM VIRIDE.



THE AMERICAN JOURNAL OF PHARMACY

APRIL, 1895.

EDUCATIONAL DEVELOPMENT IN THE PHILADELPHIA COLLEGE OF PHARMACY.

BY JOSEPH P. REMINGTON.

Pharmacy must advance ; with the extraordinary growth in the general educational field, with the striking progress which has characterized the methods of imparting pharmaceutical knowledge in the last decade, and with the absolute necessity of higher and more thorough education of those who enter the ranks, it must be apparent to all that the college which fails to come up to its full measure of the demands made upon it by the ever-widening and rapidly-growing sphere of action, must fall behind ; on the other hand, the institution which pushes recklessly forward so far in advance that it cannot carry with it the main body, will soon find itself lost in the clouds and its usefulness greatly impaired, if not irretrievably ruined. Without a progressive element in a college, destruction is certain ; without wise foresight and accurate judgment with the restraints imposed by the conditions of its *clientèle*, serious damage is equally certain.

The success of the Philadelphia College of Pharmacy must be attributed in the past to the wisdom of those who have, during the last seventy-five years, guided its destinies. In its early history, in the day of small things, a total class of twenty students was regarded as a great encouragement ; when, in the course of time, its income exceeded its expenses ; when, more than this, the college proved to its faithful sponsors that it was fulfilling its mission, and when, finally, it became the recognized centre of pharmaceutical

education in America, there arose indications which seemed to show that some of its friends believed that it had reached the acme of its development and influence. But fortunately in this crisis, the majority of those in control clearly grasped the possibilities of the future, realized that there could be no such thing as resting upon the record of the past, but that more labor and greater achievements must be the order of the day, and a backward step was not to be thought of. If this brief review of the past is correctly portrayed, it must be apparent to all that the same conditions prevail now, with the exception that they are at present greatly magnified.

The colleges of pharmacy throughout the United States were founded and have been successfully developed with mainly one object in view, *i. e.*, the fitting of the younger members of the profession for their duties as practical pharmacists, and this must always continue to be the first consideration; but the *standard* of the qualifications of the practical pharmacist will probably always remain to be a subject which admits of diversity of opinion. There are those who hold that the graduate should be an accomplished chemist, an expert botanist, well grounded in mathematics and the languages, and that too much education is beyond the reach of possibility; on the other side, there are those who maintain that such accomplishments unfit the graduate for properly performing his routine of duties—indeed, some going so far as to say that one so highly educated is placed upon a plane far beyond the needs of his position, and is, in fact, made dissatisfied with his lot as a practical pharmacist, and thus such knowledge literally *educates a man out of the business*, such a scholar is useless behind the dispensing counter.

Between these extreme views lies the truth. The education which, ten years ago, would have been considered ample to fit the pharmacist perfectly for his daily work is totally inadequate for the demands of to-day; for, as that most pungent writer of his time, Carlyle, puts it: "The goal of yesterday is but the starting-point of to-morrow." One has but to consider the enormous additions to our materia medica, the flood of synthetic remedies which must be intelligently dispensed, and the practice of the modern, but much abused, elegant pharmacy.

It is easy to fix a standard, and a college catalogue may teem with requirements which, upon paper, seem very alluring to the

advocate of the highest culture ; but even if the ambitious aspirant has succeeded in reaching such a dizzy height, the question may well be asked : " Will the possessor of such rare accomplishments ever condescend to accept service in a pharmacy ? " In the present condition of the drug business, it must be admitted that there are many other fields of activity which will promise a far better pecuniary return for such a gifted individual, but it must be acknowledged that too little education is far worse than too much. The " rule-of-thumb " druggist who sneers at the college-bred man, and says he can " learn " his boys more in a month than the college can in a year, has his own standard, and it must be a cause of rejoicing for all well-wishers of pharmacy that this man's power for evil is dying just in proportion as the cut-rate evil is progressing. His standard is the mercantile one, and what is he in the drug business for, if it is not solely to sell drugs ?

But, leaving this unpleasant individual, let us turn to the means of training outside of the colleges—*the education of the shop*. There are yet thousands of conscientious preceptors who do not consider the assistants in their employ as mere money-getting machines for them, but view them as fellow-creatures, who will soon be called upon to assume the same responsibilities that they themselves are grappling with, who realize that the profession, of which they themselves are honored members, must advance, and that the assistant of to-day must perforce start, theoretically, at least, where the preceptor left off ; and that, while in his time, three hours a week at college, with such stolen opportunities from daily routine of shop duties as could be snatched, saw him through college, that "*tempora mutantur, et nos mutamur in illis* ;" and it must be remembered that all of our colleges of pharmacy owe to these men a debt which can never be adequately discharged.

It is unfortunate that, at the present time, an effort is being made by some pharmaceutical writers to ignore the value of shop experience, and to insist that the college degree should be conferred before any such experience is acquired. The principal reason upon which this action is based is that the college has no adequate means of judging of the value of this shop experience, and that many students present certificates, which attest to the requisite number of years in the drug business, but which cannot afford any criterion of the preceptor's fitness to give valuable instruction in pharmacy.

While these facts are in a measure true, and there does not seem to be in sight at present any better way than to compel each candidate for the degree to present a duly witnessed and attested certificate of time served, it must be plain that the practical examinations which the college compels the candidate to pass, can be made to measurably reflect the teachings of the preceptor; and it would seem to be illogical and unwise to graduate students and declare them to be fitted to fulfil their duties as practical pharmacists when they have never had a day's experience in a pharmacy.

Shall the work of the good preceptor count for nothing, because of the incompetence of some? Can a man serve four years in a drug store and learn absolutely nothing? And is it possible for one who has never served a day behind the counter, and yet passed a successful examination, to be expected to equal in efficiency one who has served four years and, in addition, had his college education and passed his examination besides? Has the time come for the colleges to throw away this immense advantage which the pharmaceutical student possesses over all other professional students, of actually practising pharmacy, either before he comes to college or after he has entered it? Is not the diploma of a college, which requires this practical experience before graduation, far more valuable in securing for its possessor a remunerative position, than one which grants its diploma to those who never had a day's actual experience? If it has been the misfortune of a student to have served his time with a careless or incompetent preceptor, it should be the duty of the college to repair the loss as far as possible, and every well-equipped college has in its laboratories the means of at least measurably overcoming such a misfortune; but for the college to ignore the value of actual practice in the shop is to throw away an advantage of the first importance. *The work of the preceptor and the college labors of the students should go hand in hand*, and what better way can be devised of keeping the college work in touch with the daily duties of the shop, than the conferences which should be held continually between master and assistant? The preceptor gains greatly; the new points which have been developed since he sat on the benches at college, are discussed and possibly illustrated and amplified to the edification of both, whilst the effect upon the student, upon finding a willing helper and a sympathetic adviser in his daily work, is of incalculable benefit. Surely the best

interests of pharmaceutical education lie in the direction of building up these relations between the preceptor and the assistant, and every effort should be made on the part of the college to foster the interest and influence of such a preceptor. Because some preceptors neglect their privilege and duties, does this constitute sufficient grounds for the college to ignore the work of all? When the point has been reached (and it is sincerely hoped that such a misfortune will never occur), when an able preceptor's work is counted as nothing, or worse than useless, then may we look for the decadence of American pharmacy.

But what shall be said of the druggist who never gives his assistant the slightest training; whose business is limited strictly to merchandising; who gives nothing, yet takes all; whose object is to pay his assistant the lowest salary and exact the utmost amount of labor possible? A moment's time spent by the assistant in examining a drug, testing a chemical or making a preparation, is regarded as a serious fault; kept on the move all day long, deprived of sufficient time to even digest his food properly, and then compelled to rush off to his lectures with his mind and body in a condition of exhaustion, he is surely an object to excite commiseration and arouse indignation. The trifling pecuniary consideration which drug-clerks usually receive is always admitted to be offset by the much more important factor of the personal training of the preceptor, and when this part of the contract is shown to be valueless, is it any wonder that the assistant turns to the college and demands that it shall supply the knowledge which is lacking? If the preceptor is unable to properly train his assistant, through lack of knowledge or press of business, he should be more than willing to furnish him with the opportunity to qualify himself elsewhere.

Philadelphia has long been noted for the large number of her well-educated pharmacists. It was here that the first educational institution for teaching pharmacy was established; necessarily, the influence of this school was at first local. Gradually, but surely, the desire for education grew; the little knot of enthusiastic devotees increased. The graduates of the college soon became proprietors of drug stores; these, realizing the great benefits that they had derived from their college education, with a true spirit that they were engaged in a liberal profession, were glad to offer to their assistants the privileges that they themselves had enjoyed, and in

this way the scope of its usefulness was extended. In the course of time the work of the college attracted the attention of the lovers of progress outside of the city and the State, and before many years it became apparent to all, that provision must be made for the needs of students who were eager to avail themselves of its courses of instruction.

Many of those who came had already served the necessary four years in the drug business, and necessarily desired to employ their whole time, during their sojourn in the city, in their college work. To accommodate these, laboratories were established, largely through the efforts of the Alumni Association, and this work was successful from the beginning. Students who were employed in city stores, realizing the advantages that the laboratories afforded, applied for admission, and these soon became taxed to their utmost capacities.

Up to this time such instruction was optional, but the Board of Trustees, being thoroughly convinced of the value of laboratory work, decided that all candidates for the degree should possess such knowledge. This did not necessarily compel students to attend the laboratories, but as a matter of fact the great majority knew that they could obtain this knowledge far more thoroughly at the college than elsewhere. As the methods of teaching gradually developed and improved, it soon became apparent that the student could obtain far more valuable instruction in certain branches by making preparations and conducting experiments himself, than by seeing such performed by the professors on the lecture table. The enlargement of the laboratories necessarily followed, until, at the present time, there are three in successful operation, the last one to be established being devoted to the practical study of pharmacognosy and microscopy.

The college has undoubtedly reached such a period in its development that it must be recognized that *more time* must be required of the student if he wishes to thoroughly grasp and assimilate the vastly-augmented accumulations of facts which modern pharmacy demands. It might be supposed, from a superficial view of the situation, that more intense application on the part of the student during two years of college life would meet the requirements, but the experience of our universities, particularly those devoted to the study of medicine, during the last decade has demonstrated beyond

question that nothing short of an extension of the courses will answer the imperative demands of the hour; for the student, engaged in a drug store while attending college, there can be no other alternative. Our medical schools, that formerly regarded courses of lectures extending over two years sufficient, now require a four years' course, and pharmacy owes it to herself to keep pace with medicine. The Board of Trustees of the College unanimously decided to extend the time for college attendance to *three full courses, extending over as many years*, and this requirement will go into effect with the beginning of the course in October, 1895.

This extension will enable the student not only to become more thoroughly grounded in the subjects which are a part of the curriculum, but will permit of the extension of the instruction in the direction of more advanced subjects, as well as those eminently practical. This action of the Board was not taken hastily, but was under serious contemplation for a number of years. Another step which has been contemplated for a still longer time, and which will also go into effect, is the granting of the degree of "Doctor in Pharmacy" to all who successfully complete the three years' course and pass the final examination.

The subject of granting the degree of Doctor in Pharmacy is by no means a new suggestion; it is true that the proposition was thoroughly considered twenty-two years ago by the conference of teaching colleges. The Philadelphia College, at this conference, while not disapproving of granting such a degree, felt that the time was not ripe, and *the instruction then given did not justify the change* then proposed. The degree of Graduate in Pharmacy was adopted by this College at the beginning of its career, when opposition to the establishment of the institution came from the physicians of Philadelphia who were interested in the work of the medical schools. It must be admitted that the founders of the College of Pharmacy acted wisely at the time, but since then the term "doctor" has outgrown the limited meaning which it then had, and has come to be recognized in many professions as the proper title to be bestowed upon a graduate of any professional college.

With the inauguration of the course extending over three years, with its added requirements and responsibilities, and the system of examinations at the end of each term, it is believed that such action is thoroughly justified. Pharmacy as a profession has, in the past,

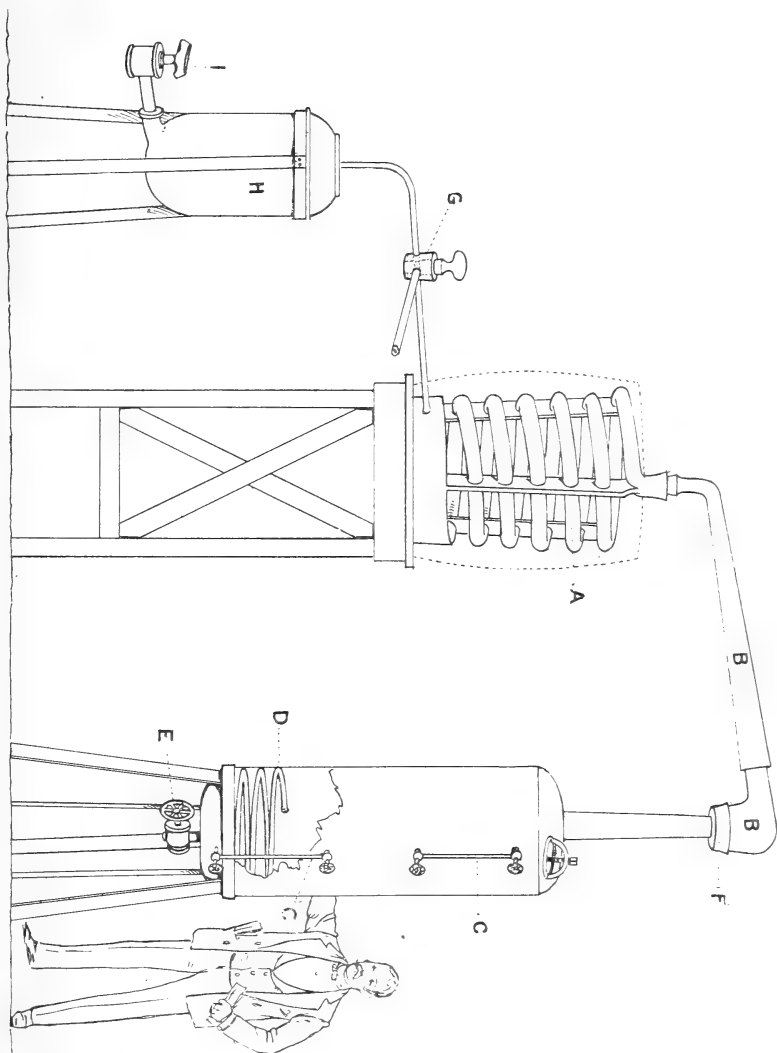
not received the *recognition from the public* which it has deserved. The colleges of pharmacy, without exception, have been maintained solely through the efforts of pharmacists themselves; we rarely or never hear of endowments or bequests from the general public to assist in their development. Public-spirited and self-sacrificing members of the pharmaceutical profession have freely contributed their services and their money for the buildings; carrying on the work, the students who have come for instruction have furnished the means for their support. It is true the latter have always been given an equivalent, and has not the time come when Pharmacy shall demand that recognition from the public which is her right?

The legislatures of our various States have recognized the principle that the pharmacist must be not only thoroughly educated in his profession, but must possess qualities which surely place him upon a professional plane; and is it not true that the people respect those who respect themselves? And while it is true that millions of great and good men have gone before, "untitled and unwept," and that titles alone do not make men, the Philadelphia College of Pharmacy believes that the time has come when it should give an education which shall command respect, and a title which will be recognized by the public as equivalent to that offered by other professional schools of no higher degree.

DISTILLED WATER.

BY J. U. LLOYD.

Water condensed from the steam of boilers that are used as the source of mechanical power is usually contaminated with oil. This oil comes both from the exhaust steam water of the engine, which is usually returned to the boiler, and in some cases, additionally, from the substances used to prevent boiler incrustation, among which crude petroleum is often employed. In the latter case the water obtained from the condensed steam may contain large quantities of oil, amounting, perhaps, to enough to coat its surface with a film of grease. In either case, under the most favorable conditions, the water procured from such a source will not, in my experience, conform to the Pharmacopœial requirements for distilled water, neither can it well be used to make official distilled water.



DESCRIPTION.

- A.* Stoneware worm.
- B, B.* Stoneware head and arm.
- C.* Water gauges.
- D.* Steam coil for boiling the water.
- E.* Stop-cock for emptying the still.
- F.* Copper flange, connecting with stone head.
- G.* Three-way glass stop-cock.
- H.* Stoneware receiver.
- I.* Stoneware stop-cock.

According to the U. S. P., "Water" that will conform to certain tests is to be used in preparing distilled water. Persons in more favorable positions than Cincinnatians may, perhaps, obtain water of this condition of purity from natural sources. However, those situated as is the writer of this paper cannot hope to attain this desideratum without previous manipulation, as the following statements will show :

(1) Persons dependent upon surface drainage, such as supplies rivers like the Ohio, realize that quantities of mud are present in its waters during most of the year. This mud is mostly clay and sand, but associated therewith are to be found considerable amounts of organic matters. Thus it is impractical to obtain the official water from the water works of cities dependent upon such sources of supply, as is the city of Cincinnati.

(2) The ice of the glacier period is supposed to have scraped out the valley of the Ohio about Cincinnati, and also the tributaries such as the Miami River (just above) and Mill Creek (just below) the city, dumping into them great beds of sand and gravel, often to a depth of several hundred feet. These are reservoirs for unlimited amounts of water (driven well water), but beneath the city of Cincinnati this stratum is impregnated with sewage to such an extent as to render it impractical as a source of "Water."

(3) Then, beneath the gravel alluded to, is found the limestone formation through which artesian wells are sunk until at a depth of about 1,800 feet from the surface, the carboniferous formation is passed and saline water (artesian water), strongly impregnated with hydrogen sulphide, rushes to a height of several feet above the surface of the ground. This water is so strongly contaminated with sulphur compounds as to blacken the lead paint for a great distance about each well, and is seemingly out of the question as a source of distilled water.

Thus it is that, notwithstanding its impurities, we must naturally depend upon the water of the Ohio River, which is practically identical with the water upon which most of our river towns depend. It follows that, in order to make distilled water, we must, to be exact, purify the natural water at our command as a preliminary step, for it does not meet the U. S. P. requirements for water; but I take it that this precaution is unnecessary if the natural water, regardless of impurities, can be employed to make a product (dis-

tilled water) that will meet the official requirements. This point, so far as I know, has not been commented upon in print, with the water under consideration.

In order to determine if this is possible on a small scale, a half gallon glass retort, with a bent neck, was connected with a Liebig condenser. The connections were not luted, being made by means of corks, every endeavor being taken to avoid grease or soluble organic matter.

A preliminary charge of water was first distilled in order to insure the cleanliness of the apparatus and the connections, after which the pharmacopœial requirements were followed. Upon applying the most rigorous tests of the Pharmacopœia, no impurity could be detected in the reserved portions of the product.¹ The permanganate test resulted in but a slight decrease in the shade of pink, and after standing for ten hours, loosely tied over with two thicknesses of tissue paper, every fraction maintained its permanganate coloration. This demonstrated that the water of the Ohio River at the time of these investigations (February and March, 1895), if employed after the method prescribed by the Pharmacopœia, will produce official distilled water. On a small scale it can therefore be practically produced by means of any suitable distillatory device.

Next, an attempt was made to determine whether it is necessary to adhere strictly to the Pharmacopœial requirements as to detail. After suspending the operation in the evening, the exit of the condenser was plugged with absorbent cotton and allowed to rest over night. Next morning the retort was charged and distillation continued, the products being fractioned into successive portions of 100 c.c. each, until nearly the entire contents of the retort had been recovered. These successive fractions were tested and each fraction was found to conform to the Pharmacopœia, even the first fraction withstanding the permanganate test.

While, therefore, the Pharmacopœia wisely provides that the first fraction of distillate (one-tenth) be thrown away, it is seen that, with clean connections and proper apparatus, every portion of the

¹ Upon evaporation in clean glass vessels, however, visible rings resulted, which, although too slight to respond to weight, were perceptible. Further report will be made on this point in the future.

distillate withstood the requirements of the authority under consideration.

The various specimens of water were next subjected to more rigid tests than those Pharmacopœial (including Nessler's test also), and were found to maintain their records for purity. After boiling ten minutes with the permanganate, they were allowed to stand, tied over with tissue paper, for several days and under different exposures, without destruction of the pink coloration. Reference only is made to this fact now, as it is the intention to give detail test results at a future day.

The foregoing points having been determined in a general way, an endeavor was next made to obtain pure distilled water on a large scale.¹

A chemical stoneware worm was made to order by the Doulton Pottery, London. It was 1 inch bore and 42 feet in length, all in one piece. To this a stone arm, connected with a stone head, was attached, thus providing that every portion of the surface touched by the condensed water should be of material unaffected by water. The head referred to sat loosely in a copper flange upon the apex of the lengthened exit of a new copper still. All connections were closed by absorbent cotton, no cement being employed.

The still was constructed of copper, being designed after the plan adapted for the concentration of such extractives as I do not wish to evaporate to dryness. In this case, instead of the usual false bottom for the steam jacket, a copper coil is thrown three times around the inside of the still, the lower line being one-tenth the space above the bottom of the still. Thus, with an extract or resin it is not necessary to watch the still constantly, for when the liquid contents are evaporated to the lower line of the coil, further evaporation ceases. All danger of injury by caking of the residue through forgetfulness is thereby overcome. The exit of the stone worm, in the present case, was provided with a three-way glass stop cock, one terminal being attached to a 25-gallon chemical stoneware jar, closed at the top and provided with a stone stop-cock at the bottom. The other terminal of the stop-cock was intended to divert the first portions of the distillate in case continuous distillation was found to

¹ After this paper was written, the *Chemiker-Zeitung*, No. 15, February 20, 1895, reached me, with description of a patented apparatus for making distilled water.

be impracticable. This, in general, describes the apparatus—shown in greater detail by the accompanying drawing—the comparison with the figure beside it showing the relative size of the various parts of the device.

First, a charge of 15 or 20 gallons of water was distilled in order to completely cleanse the apparatus. The first part of the distillate was found to be contaminated with oil that came from the new water-pipe connections through which the still was fed. Upon thoroughly cleansing them, however, no further trouble of this description was experienced. Finally, the water passed transparent, colorless and odorless, and was found to conform in every way to the requirements of the Pharmacopœia, excepting the matter referred to in note 1, p. 193. By Nessler's test no trace of ammonia could be detected.

Thus it was shown conclusively that the water of the Ohio River, at the time these investigations were made, would readily produce official distilled water. Not only did the large still, when operated according to the official method, produce water of a quality to meet the exactions of the U. S. P., but it does so by continuous distillation, regardless of fractionation, and it retains its quality from the first to the last part of a charge.

In considering, furthermore, the conditions necessary to insure reliable test returns, it is scarcely necessary for me to state that the reagents were exceptionally pure and free from dust, and were dissolved in pure, distilled water. The vessels employed to hold them, and the water-bottles as well, were previously cleaned with both caustic potash solution and sulphuric acid, and all subsequent finger-mark contaminations were carefully avoided.

The water operated upon contained 0.022 per cent. of solid matter, and the residue taken from the still after the operation deposited a heavy layer of yellow mud.

To persons convenient to clean, natural water, such a report as this may seem unnecessary, but to those who realize the necessity in this neighborhood of a correct understanding of the subject, the matter is important.

The evidence is unquestionably to the effect that pharmacopœial distilled water can be made, by means of suitable apparatus, out of the impure Ohio River water. Under what condition it subsequently alters, if at all under proper care, will be the subject of a future

paper, as exacting investigations in these directions are in process and will be carried on during the coming summer.

STRUCTURE OF VERATRUM VIRIDE.

BY EDSON S. BASTIN.

This liliaceous plant is a perennial herb native to eastern North America, and ranging in its habitat from Canada to the Carolinas. It prefers damp localities, such as the borders of moist thickets, the banks of mountain streams, etc. Its erect, leafy stem rises to the height of from two to seven feet and, except in the inflorescence, is unbranching. The leaves are three-ranked, simple, broadly-oval, acute or acuminate, entire-margined, basi-nerved and plicate along the principal nerves, so that on their lower surface they present a strongly-ribbed appearance. They clasp the stem at their base and so ensheath it that a cross-section of its lower portion shows it to be enclosed in a succession of thin cylinders. The lower leaves, which are from six inches to a foot long, are the broadest, those above gradually decreasing in size and relative width to linear-lanceolate bracts, next the inflorescence.

The inflorescence consists of a terminal pyramidal panicle from eight to sixteen inches long, and composed of dense spike-like racemes of greenish-yellow, monœciously polygamous flowers, each subtended by a pointed bract.

The perianth consists of six pieces, the three outer (calyx) very similar in form and color to the three inner (corolla), except that they are a little longer. All of the pieces are distinct, or very slightly united at the base, lanceolate in outline, somewhat narrowed and thickish at the base, and ciliate-serrulate on the margin.

The andrœcium consists of six stamens, which are distinct, hypogynous, and shorter than the pieces of the perianth.

The gynœcium consists of a single, three-carpeled pistil, which is exteriorly three-lobed, and with three sessile, recurved stigmas. Internally, the ovary shows an axile placentation and numerous ascending anatropous ovules. The fruit is a septicidal capsule containing usually in each loculus from eight to ten flattish-oblong, membranous-margined seeds.

The plant is so similar to the European *Veratrum album* as to lead many botanists to regard it as only a variety of that species. The general aspect of the two plants, however, is quite different, ours having greener flowers, its panicles more compound, and the

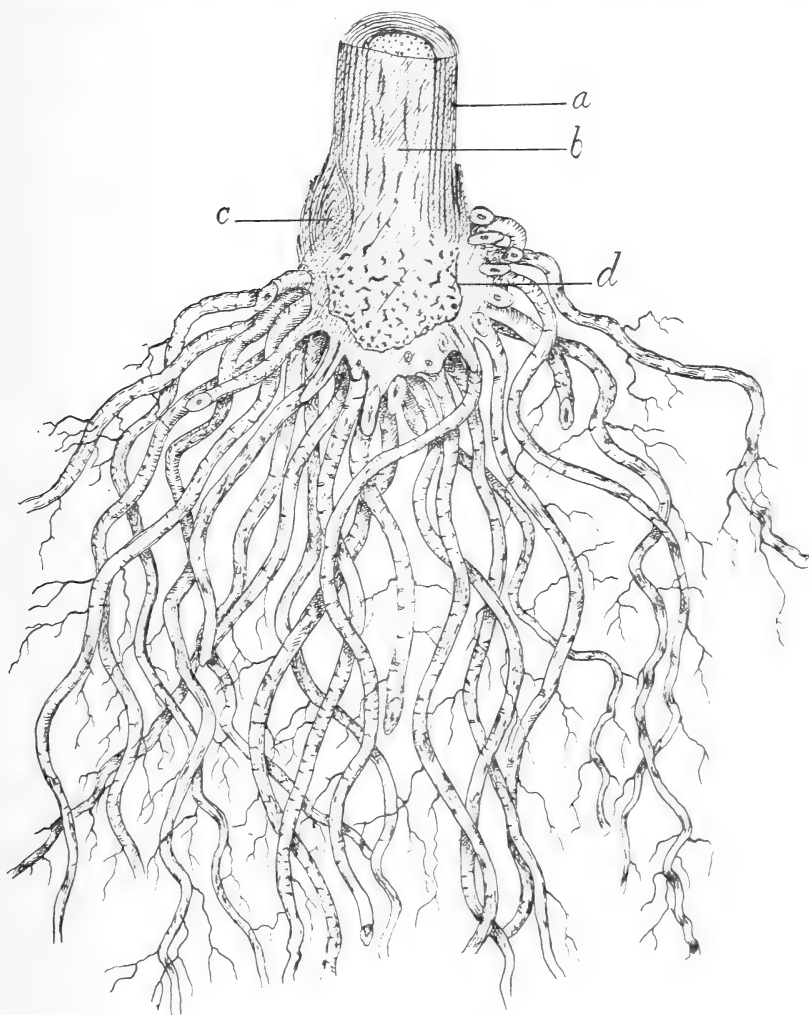


FIG. I.

component racemes more loosely flowered and less regular, and also having its leaves more pointed. The plate illustration conveys an idea of the general appearance of the plant.

In our latitude the blossoming takes place in the latter part of June or early in July.

The rhizome is fleshy, upright or oblique, obconical, one and one-half to three inches long, and one to one and one-fourth inches thick at its upper end, and densely covered with somewhat fleshy, simple roots, about one-twelfth of an inch thick and from six to ten inches long. Those toward the somewhat truncate lower end of the rhizome are dead, or, in older rhizomes, even withered away, leaving rounded scars. In the fresh state the roots are white, the

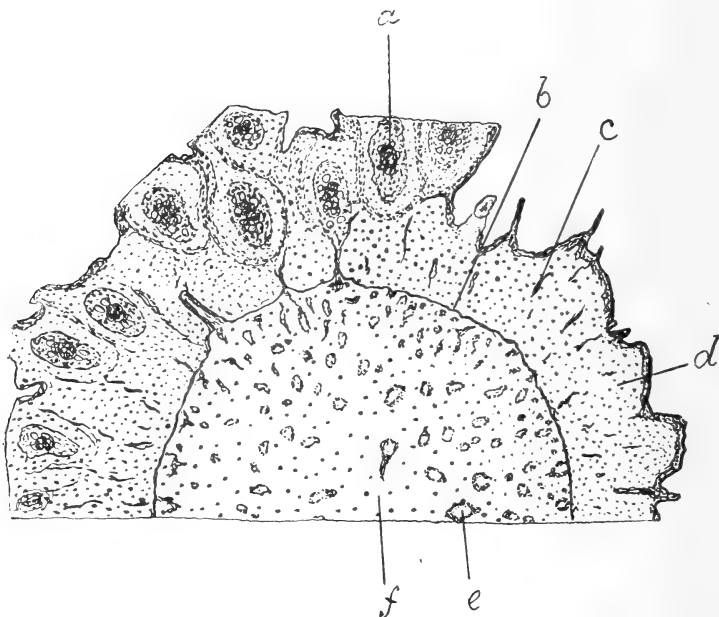


FIG. 2.

older ones closely and irregularly wrinkled, while the younger ones are nearly smooth; but in the dried form the color is yellowish or yellowish-brown, and all the roots are much shrivelled and wrinkled. The wrinkling is due to the loosely arranged and thin-walled parenchyma of the cortex, and particularly to the numerous large, lysigenous, intercellular spaces in the cortex. Toward the lower ends of the roots are numerous fine fibrils, which, however, are only sparingly present in the dried drug.

The central radial bundle of the roots is from eight to fourteen

rayed, with conspicuously large scalariform ducts at the inner ends of the xylem rays, and very small ones at the exterior ends. The cells of the endodermis have their outer walls thin, but those of its cells which come opposite the phloem masses are conspicuously thickened in their inner and radial walls. Those opposite the ends of the xylem rays are usually but slightly thickened.

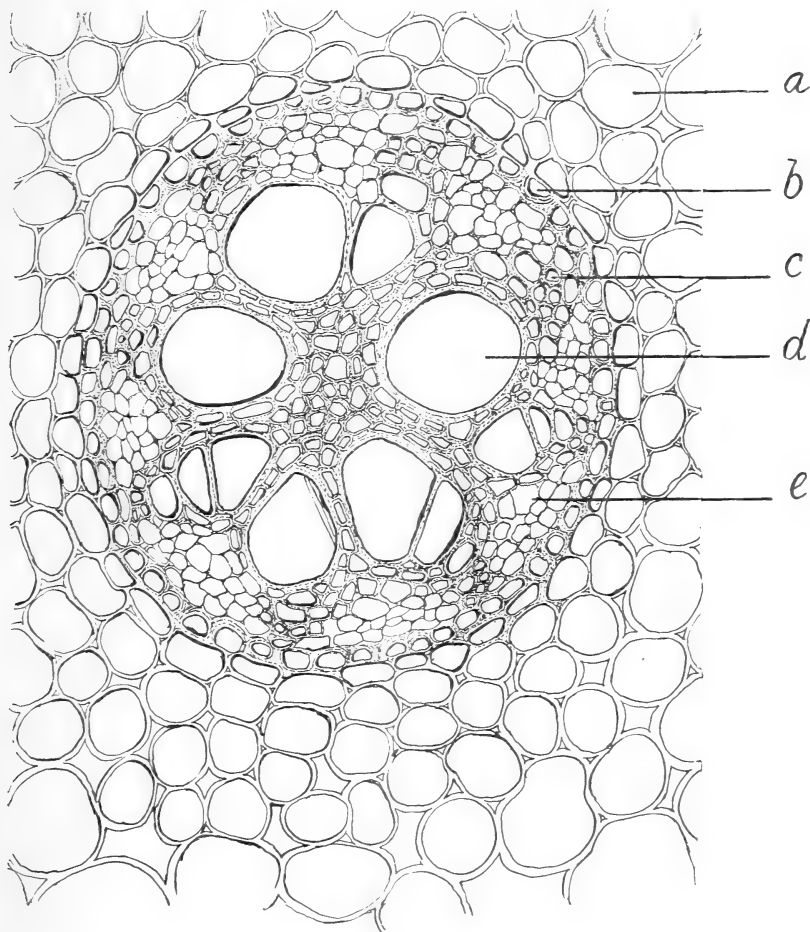


FIG. 3.

The rhizomes in the dried forms are dark brown, or blackish, exteriorly, usually crowned at their upper end with the remains of the solid above-ground stem, ensheathed by the numerous thin, tunicated leaf-bases. To facilitate drying, they are commonly split

in a longitudinal direction, into two or more wedge-shaped or flat pieces. The fracture is short, and the color, internally, whitish. The cross-section shows a distinct cylinder sheath forming an irregular dark line between the central cylinder and the thickish cortex. The bundles are of the concentric type, with a small central phloem surrounded by two or three layers of small-sized scalariform ducts and tracheids, and these are bounded exteriorly by an endodermis.

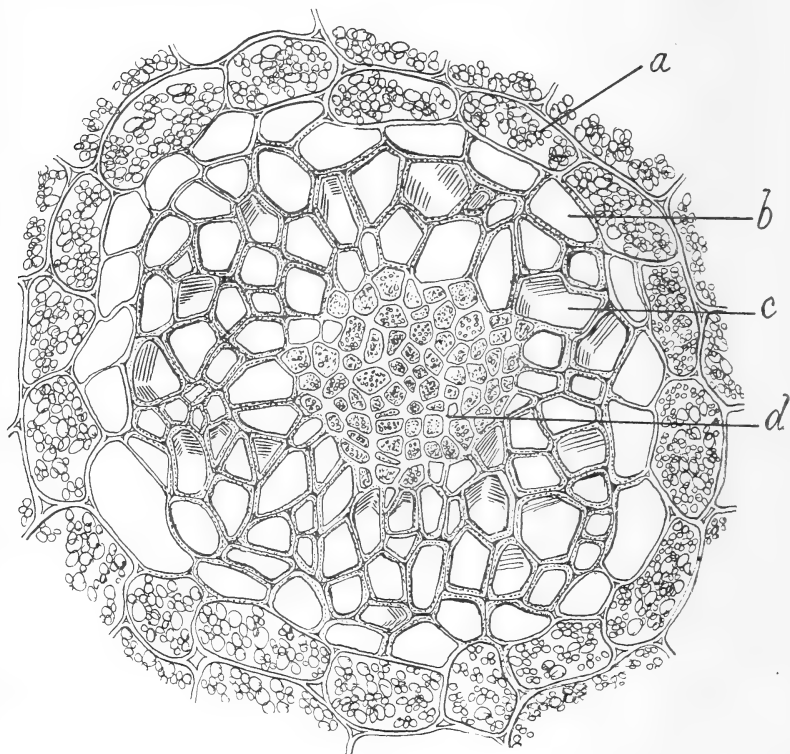


FIG. 4.

The ducts and tracheids are irregular in form and direction in the bundle. The bundles also pursue a very irregular course in the rhizome, so that a cross-section cuts some of them transversely, others longitudinally, and still others obliquely, giving rise to the appearance of numerous irregular brownish dots and wavy lines, imbedded in the whitish parenchyma. In the cortex, the wavy lines and dots are also present, but less numerous, and toward the outside are seen the sections of the root-bundles near their origin.

Owing to the peculiar course of its bundles, the appearance of the longitudinal section of the rhizome is not very unlike that of the transverse section.

The parenchyma of both roots and rhizome is rich in small-grained starch, and there are also in both scattered cells containing bundles of needle-like raphides.

The starch grains are sometimes nearly spherical, simple, and with a central, and often fissured, hilum; but they are more frequently compound, consisting of two, three, or sometimes of a larger number of easily separable grains. Stratification lines are only recognized with difficulty, even in the largest grains.

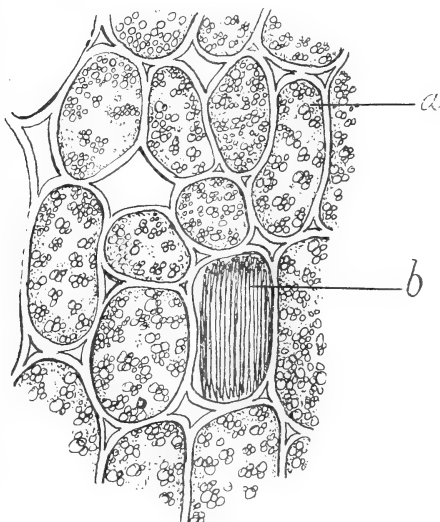


FIG. 5.

The writer has observed in one instance the fraudulent substitution of the rhizome and rootlets of *Symplocarpus foetidus* for those of *Veratrum viride*. The drug was so prepared that the incautious purchaser might easily have mistaken it for the genuine article, but the fraud could not have deceived a careful observer, for the roots of *Symplocarpus* are much coarser, averaging at least an eighth of an inch in diameter; the rhizomes also average considerably larger, the cortex is relatively thicker, the structure of the rhizome is more porous, the starch grains are much smaller, and the leaf-bases at the top are much less numerous and not tunicated. The foetid odor of

Symplocarpus is also characteristic; but when the drug has been kept for some time, this odor becomes faint, or entirely disappears, and so is less reliable than the structural characters as a means of identification.

As between the rhizomes of *Veratrum album* and those of *Veratrum viride*, it would indeed be very difficult to distinguish by structural, or any other characters, if the drugs were trimmed alike. Fortunately, however, this is not the case, the rhizomes of *Veratrum*

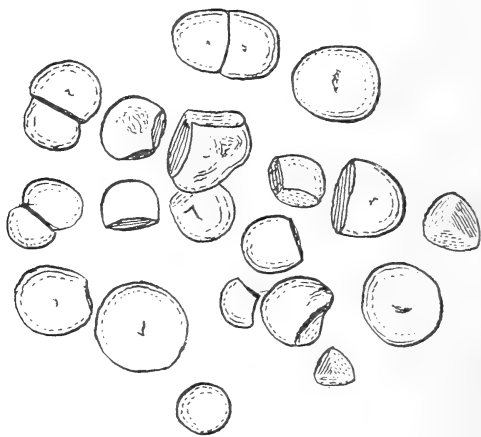


FIG. 6.

album having the roots mostly trimmed away, while those of *Veratrum viride* are not removed.

DESCRIPTION OF FIGURES.

Plate.—Plant of *Veratrum viride* in natural colors, about one-sixth natural size.

Fig. 1.—Longitudinal section of fresh rhizome, about one-half natural size. *a*, tunicated leaf-bases; *b*, above-ground stem; *c*, lateral bud; *d*, cylinder sheath.

Fig. 2.—Diagram of half of cross-section of rhizome magnified about five diameters. *a*, section of root near its origin; *b*, cylinder sheath; *c*, one of the wavy bundles in cortex; *d*, cortical parenchyma; *e*, a bundle of the central cylinder; *f*, parenchyma of the central cylinder.

Fig. 3.—Portion of cross-section of root, showing central radial bundle and a little of the surrounding cortex. *a*, cell of cortical parenchyma; *b*, endodermal cell opposite phloem mass; *c*, small duct at outer end of xylem ray; *d*, large duct at inner end of xylem ray; *e*, phloem mass. Magnification, 230 diameters.

Fig. 4.—One of the bundles of the rhizome, as seen in cross-section, magnified 370 diameters. *a*, cell of parenchyma exterior to bundle; *b*, cell of endo-

dermis; *c*, scalariform tracheid in xylem; *d*, phloem tissues occupying centre of bundle.

Fig. 5.—Small portion of parenchyma of rhizome, magnified 230 diameters. *a*, cell heavily charged with fine-grained starch; *b*, cell containing a bundle of raphides.

Fig. 6.—A few starch grains of *Veratrum viride*, magnified 1,200 diameters.

THE CHLORINATED COMPOUNDS OF THE U. S. P.

BY CHAS. H. LA WALL, PH.G.

In the Pharmacopœia of 1890 the strength of the two chlorinated compounds was made uniformly higher than in the previous edition of the same work, the strength of *Calx Chlorata* being changed from 25 per cent. to 35 per cent. of available chlorine, and the strength of *Liquor Sodæ Chloratæ* being changed from 2 per cent. to 2.6 per cent. of available chlorine.

The former of these two articles is beyond the jurisdiction of the pharmacist, regarding its preparation, as it can be made more economically and satisfactorily on the large scale. *Liquor Sodæ Chloratæ*, however, is prepared in every carefully-managed pharmaceutical establishment, as it can be economically and expeditiously made on the small scale, and is all the better for being freshly manufactured.

The present official process for the preparation of solution of chlorinated soda is not satisfactory in all respects. The principal difficulty consists in allowing just enough chlorinated lime, of the full official strength, to produce a finished preparation, also of full official strength.

As will presently be shown, the strength of a number of samples of chlorinated lime, which were examined by the writer of this article, was found to be far below the official standard; but, even granting that this were not the case, and that the strength of chlorinated lime is uniformly 35 per cent., it would still be extremely difficult, if not impossible, to make solution of chlorinated soda of standard strength by following the present official process.

In a series of carefully conducted experiments upon known quantities of the substance, whose strength was in all cases previously ascertained, the writer was unable, at any time, to extract all of the available chlorine from a sample of chlorinated lime, by exhausting it as the Pharmacopœia directs. The process in the Pharmacopœia

directs that the chlorinated lime shall be exhausted of its available chlorine by repeatedly triturating with water and pouring off the supernatant fluid, and subsequently pouring the residue upon the filter, washing it with the remainder of the water, the proportion of water used in exhausting it being to the chlorinated lime as $6\frac{2}{3} : 1$; this solution is then mixed with the solution of sodium carbonate, and the mixture subsequently filtered.

In the process of the 1880 Pharmacopœia, the chlorinated lime was mixed with four times its weight of water, and the solution of carbonate of soda poured into the mixture. The preparation was allowed to stand for a certain length of time, after which it was strained through muslin, allowed to settle, and the clear liquid removed afterward by means of a syphon.

Much has been written concerning the composition of chlorinated compounds, and of chlorinated lime in particular; but from a rational view of the subject, it would be more natural to suppose that the process in which the decomposing action of the sodium carbonate is brought to bear upon the whole bulk of the chlorinated lime, instead of upon washings of it, which have been found to be far from uniform, would be the one to give the greater percentage of available chlorine. The results from several careful experiments upon the practicability of completely exhausting a given sample of chlorinated lime, show the following average:

The first trituration extracted less than the second, and the available chlorine remaining in the residue amounted to about 10 per cent. of the total.

	Per Cent.
The total available chlorine in the sample was taken as	100'00
Amount extracted by first trituration	33'28
Amount extracted by second trituration	40'58
Washings of residue extracted	14'41
Available chlorine determined in residue	11'04
Total	99'31

Working with the two processes simultaneously, and using chlorinated lime of the same strength in both instances, the writer was unable, in any case, to obtain a product by the 1890 process, which contained as much available chlorine as that made by the 1880 process.

This appears to be due, in a great measure, to the two operations of filtration which are embodied in the present official process, and in both of which cases the residue is very difficult to exhaust completely.

Given the same degree of care and attention, the 1880 process affords a better preparation in a shorter time, both of which results are of unquestionable advantage.

After an experience of manufacturing over 300 gallons of the preparation, within three weeks (to be used in the flooded districts of Pennsylvania during the spring of 1894), it is the opinion of the writer that the 1880 process, which was used after one trial of the present process, which trial proved unsatisfactory, is by far the better of the two, as it was found by using it, that a preparation containing a larger percentage of available chlorine could be made with a decided saving of both time and labor. It also occurred at the time that the injunction to dispense a clear liquid was somewhat unnecessary, as the liquid syphoned off, while still slightly cloudy, was by no means unsightly; and the filtration which was necessary to produce a clear liquid, without waiting for it to settle, added to the time, labor and cost of preparation, while it in no wise added to its good qualities.

While working upon this subject a few experiments were also made to test the validity of the following assertion, which is made in the United States Dispensatory, page 825. "When it (solution of chlorinated soda) is boiled, chlorine is not given off, nor is its bleaching property sensibly impaired, and when carefully evaporated a mass of damp crystals is obtained, which, when redissolved in water, possesses the properties of the original liquid."

The following experiments were performed with the accompanying results.

The first sample was evaporated upon a water bath almost to dryness, the residue dissolved and water added to restore the original volume. The loss was 1.205 per cent. of available chlorine.

Sample number two was evaporated to a small volume in an air bath, temperature 60° C., and redissolved as before. The loss of available chlorine amounted to .597 per cent. The third sample was evaporated to complete dryness in the air bath, and the original volume restored as in the previous cases. The loss was 1.644 per cent. of available chlorine. These experiments show that, while

the original properties of the liquid may be recovered, it is accompanied by a diminution of strength.

50 c.c. of the solution were exposed to spontaneous evaporation in the laboratory; after twenty-four hours the liquid was found to have gained .122 per cent. in strength, and after forty-eight hours it had gained .593 per cent. This would indicate that a preparation deficient in strength might be brought up to the official standard by carefully evaporating some of the solvent, but no experiments on this subject were performed with large quantities.

The results which were attained by these investigations would indicate that the process for the preparation of solution of chlorinated soda should be more thoroughly tested before the next revision of the Pharmacopœia.

The strength of the market samples of chlorinated lime, as referred to in the beginning of this article, was also investigated with the results as tabulated below.

Number.	Per cent. of available Cl.	Condition.	Remarks.
1	35.15	dry	Bulk stock.
2	6.2	moist	Pasteboard box.
3	32.68	damp	Pasteboard box.
4	25.69	damp	Pasteboard box. Same brand as No. 3.
5	32.38	dry	Pasteboard box. Same brand as Nos. 3 and 4
6	32.25	dry	Bulk Stock.
7	14.64	damp	Pasteboard box. Bore guarantee of full strength.
8	9.35	moist	Pasteboard box. Same brand as No. 2.
9	38.36	dry	Bulk stock.

The samples were procured from a variety of trade sources, and it is thought that they fully represented the market condition of the substance. In 1892, before the recognition of the new standard, Dr. E. R. Squibb examined eight market samples with an average of 28.66 per cent. (*Ephemeris*, page 1330). The average of the above nine specimens was but 25.20 per cent., but there were several samples which were of scarcely any value whatever, and eliminating these, the average would be fairly good, but not yet up to the standard. Evidently the pasteboard containers do not preserve the

substance for a great length of time, as the bulk stock samples, which were presumably fresh, were higher in percentage than those in the pasteboard boxes, which had no doubt been kept in stock for some time.

305 CHERRY STREET, PHILADELPHIA.

CHEMICAL EXAMINATION OF SOME COMMERCIAL VARIETIES OF CACAO.

BY WILLIAM E. RIDENOUR.

Contribution for the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 138.

This paper is confined exclusively to the chemical examination of some commercial varieties of Cacao and is intended to supplement Professor Edson S. Bastin's publication, "Starches in Commercial Varieties of Cacao," AM. JOUR. PHARM., 1894, page 369.

The present work was carried out in the Chemical Laboratory of the Philadelphia College of Pharmacy, under the direction of Professor Henry Trimble.

The following are the varieties of Cacao examined: Bahia, Surinam, Java, Trinidad, Roasted Trinidad, Ariba, Caracas, Roasted Caracas, Granada, Tobasco, Machalle, Maracaybo.

The process will first be given and the results then tabulated.

Estimation of Fat.—Three grammes of the beans were finely comminuted with an equal bulk of purified sand and this mixture extracted with petroleum ether in a Soxhlet apparatus for 10 hours, although afterwards a shorter time was found sufficient for complete exhaustion.

The percolate was transferred to a tared beaker, evaporated and dried under a desiccator until of a constant weight (when dried at 100° C. the character of the butter appeared to be changed, as it remained liquid at normal temperatures for several days).

Estimation of Alkaloid, Theobromine.—P. Suss's process (*Ztschr. f. Anal. Chem.*, *Apotheker Ztg.*, 1893, 78; AM. JOUR. PHARM., 1893, 170) was used for the estimation of the alkaloid. The residue, after separating the fat, was boiled for one-half hour with 200 c.c. of distilled water and six grammes of freshly-prepared pure lead hydrate, strained, expressed and filtered; the insoluble portion was boiled twice with 100 c.c. of distilled water and the united filtrate evapor-

ated to 10 c.c., transferred to a separating funnel and agitated for three minutes with 100 c.c. of chloroform. After complete separation of the chloroform, requiring about three hours, the latter was removed and the operation repeated three times.

From the combined chloroform solutions, the greater portion of the solvent was distilled off, the remaining portion transferred to a tared beaker, the flask rinsed with warm chloroform and the contents of the beaker evaporated to dryness in a water bath.

The theobromine was obtained in the form of almost perfectly white microcrystalline powder, which observation agrees with P. Suss, but is contrary to the assertion made by Wanklyn (*Cocoa and Chocolate Analysis*, page 48).

Estimation of Albumen.—The nitrogen was estimated by the Kjeldahl process; and the percent. found multiplied by the factor 6.25 gave the amount of albumen.

Estimation of Glucose, Saccharose and Starch.—The powdered beans, after extracting the fat, were treated with 100 c.c. of distilled water, filtered and then twice again extracted with 50 c.c.; the united filtrate was divided into two equal parts; in one portion the glucose was estimated by Fehling's solution; the other portion was boiled three hours with dilute acid to convert the saccharose into glucose, and was then estimated by Fehling's solution.

The difference between the first and second reduction gave the reducing effect due to saccharose.

The residue from the above was boiled three hours with acidulated distilled water, to convert the starch into glucose, filtered, and the glucose estimated in the filtrate by the above process and calculated into starch.

Lignin and Cellulose.—Ten grammes of the powdered beans were extracted in a Soxhlet apparatus with petroleum ether for eight hours, or until exhaustion of the fat was complete; the residue was dried and then treated with 200 c.c. of hot distilled water, strained, expressed and filtered; this operation was repeated twice. The residue from this hot-water extraction was next treated with alkaline water until the color, which was very deep in the first alkaline water, was no longer given to the filtrate.

The insoluble portion was next treated with acidulated water.

After extracting with these four solvents the residue was dried to a constant weight and then treated with chlorine water for twelve

hours; the insoluble matter was again dried and weighed and the loss calculated as lignin. The residue was then incinerated and the loss estimated as cellulose.

Moisture and Ash.—The moisture was obtained by drying two grammes of the powdered beans at 100° C., in an air-bath to a constant weight. The residue was incinerated, which, when weighed, gave the ash. A qualitative examination of the ashes gave the following general constituents:

Potassium.	Phosphates.
Magnesium.	Sulphates, trace.
Calcium.	Chlorides, trace.
Sodium.	Carbonates, trace.
Silica.	

Iron was found in varying quantities in all except the Tobasco beans.

Weight of Beans.—The determination of the weight of one bean was found by taking the average of fifty beans:

	Grammes.	
Bahia	856	
Surinam	1'175	
Java	994	
Trinidad	1'295	
Ariba	1'434	
Roasted Trinidad	1'189	
Caracas	1'447	
Granada	920	
Tobasco	1'266	
Machalle	1'237	
Maracaybo	1'364	
Roasted Caracas	1'214	

	Bahia.	Surinam.	Java.	Trinidad.	Ariba.	Caracas.	Granada.	Roasted Trinidad.	Tobasco.	Roasted Caracas.	Machalle.	Maracaybo	Average.
Fat (cacao butter)	42'10	41'03	45'40	43'66	43'31	36'81	44'11	41'89	50'95	37'63	46'84	42'20	42'99
Theobromine	1'08	'93	1'16	'85	'86	1'13	'75	'95	1'15	'99	'76	1'03	'97
Albuminoids	7'50	10'54	9'25	11'90	10'14	10'59	9'76	12'02	7'85	12'36	12'69	11'56	10'51
Glucose	1'07	1'27	1'23	1'38	42	2'76	1'81	1'48	'94	1'76	1'60	1'09	1'40
Saccharose	'51	'35	'51	'32	6'37	1'56	'55	'28	2'72	'51	'46	1'36	1'20
Starch	7'53	3'61	5'17	4'98	1'58	3'81	6'27	5'70	3'51	6'07	1'35	1'69	4'27
Lignin	7'86	3'90	6'10	5'68	4'62	3'28	5'55	5'87	6'44	9'05	5'95	7'16	5'95
Cellulose	13'80	16'24	13'85	13'01	14'07	16'35	13'49	19'64	12'57	11'69	11'32	17'32	14'44
Extractive matter (by difference)	8'99	13'53	8'90	8'31	9'00	12'72	9'72	5'84	9'26	9'22	9'02	6'79	9'30
Moisture	5'96	5'85	5'12	6'34	5'90	6'63	5'28	2'63	1'55	5'09	5'86	5'07	5'18
Ash	3'60	3'05	3'31	3'60	3'73	4'36	2'71	3'70	3'06	5'03	4'15	4'13	3'70

THE DETERMINATION OF PYROPHOSPHORIC ACID IN THE PRESENCE OF ORTHOPHOSPHORIC ACID AS APPLIED TO SOLUBLE IRON PYROPHOSPHATE, U. S. P.

BY J. B. NAGELVOORT.

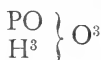
(Received for publication, Jan. 16, 1895.)

(1) F r e s e n i u s teaches, that the precipitate obtained upon the addition of *magnesium sulphate* to an aqueous solution of a pyrophosphate of an alkali, $Mg^2P^2O_7$, is soluble in an excess of the pyrophosphate, as well as in an excess of the magnesium sulphate.

(2) Th. Salzer remarked, in the *Archiv der Pharmacie*, Band 232, Heft 5, p. 371, 1894, "*Ueber Natrium pyrophosphate*," that it is "doubtful if this solubility of the precipitate is a characteristic property of pyrophosphates."

He published the remarkable experience that he found an orthophosphoric acid, which showed all the identity reactions of a pyrophosphate, with the exception of the one with potassium permanganate. The orthophosphoric acid that led to this discovery was contaminated with one-fourth of an acetyl compound of one of the oxyacids of phosphorus. A sodium salt of this compound, mixed with 5 parts sodium diorthophosphate, gives a *pure white* precipitate with silver nitrate solutions, this white precipitate being the well-known identity reaction for pyrophosphoric acid.

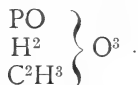
Writing *phosphoric acid*, according to G e r h a r d t's type theory,



and replacing one atom H with the radical,



we have for Salzer's acetyl compound,



(3) It will be readily conceded that Salzer's experience is of importance to us, and that a wider knowledge of it may end the doubt and confusion for manufacturers of pyrophosphates, and for dispensers of it, in which, unfortunately, the seventh edition of the U. S. P. leaves its readers where they have to make a determination of pyrophosphates in the presence of orthophosphates.

(4) The prescription of the U. S. P. which is referred to here (p. 193) is all very well for an expert analyst. But it does not work well with less experienced operators. The writer received, lately, official complaints from manufacturers of pyrophosphates, that they objected to the application of the U. S. P. test for purity of their article, *i. e.*, absence of orthophosphates.

(5) I agreed. But they seem not to have read an article by my colleague, Prof. Dr. Julius Stieglitz, on the previous Pharmacopœia, or it has escaped their memory (*Am. J. Ph.*, 1891, p. 585).

(6) The reader is requested, to prevent misunderstanding, to operate literally, as is here prescribed. This will furnish proof to any unbiased mind that it is better to make the determination of pyrophosphoric acid in the presence of orthophosphoric acid, according to Fresenius, than according to the U. S. P.

(7) "If 1 gm. of the salt *be boiled* with 10 c.c. of potassium hydrate T.S., a red-dish-brown precipitate will be produced, and if the colorless filtrate from this precipitate *be strongly* acidulated with hydrochloric acid, then *magnesia mixture* added, and subsequently *a slight excess* of ammonia water, no precipitate should be produced."—U. S. P., p. 193.

(Italics are mine.)

(8) This somewhat vague prescription (see italics) is a source of fatal errors to an operator of limited experience in analytical chemistry.

Two (2) c.c. magnesia mixture seem to be a fair proportion for the colorless filtrate, and *five* (5) drops of ammonia water furnish the slight excess of the latter.

In five commercial samples, used for this paper, I did not obtain an orthophosphoric acid reaction with two (2) c.c. magnesia mixture and five (5) drops of ammonia water. *Orthophosphoric acid* was, however, largely present in all the samples, as is shown below, where other results are recorded, obtained from the same samples.

I found that many iron pyrophosphates in the market are only pyrophosphates in name; that pyrophosphoric acid, for economy's sake, perhaps, is only to be found on their labels.

(9) The confusion of the quoted vague prescription of the U. S. P. is to be avoided as follows (to which Dr. Stieglitz called attention already years ago):

Dissolve 1 gm. of the salt under examination, for the determination of pyrophosphoric acid, in ten (10) c.c. of water.

I do not advise boiling. There is no necessity for it. When the salt is dissolved, add 10 c.c. of a 10 per cent. solution of potassium or sodium hydrate; stir and filter, after a little while, into a 25 c.c. graduate. You will obtain between 12 and 15 c.c. colorless filtrate. (Perforate the filter, and submit the mixture of the salt, and the potassium or sodium hydrate solution to a somewhat longer contact *if not colorless*.)

Add five (5) c.c. of a 10 per cent. ammonium chloride solution, and *drop by drop*, from a pipette, from 1 to 2 c.c. of a 10 per cent. magnesium sulphate solution. Shake the graduate slowly as long as the precipitate, that forms, redissolves. *Do not stir vigorously*.

In this way, orthophosphates of the alkalis can be separated from pyrophosphates, a similar manner of separating as is in use in the separation of narcotine from morphine, in opium assaying, according to the process of Dieterich (*Helpfenberger Annalen*). Orthophosphate of ammonia and magnesia forms later, if present, and sinks to the bottom of the graduate, as a distinctly different microcrystalline substance.

When the filtrate *remains* clear, no orthophosphate is present.

These proportions of ammonium chloride and magnesium sulphate, and the conditions under which the reactions took place, were found favorable for the determination of alkali pyrophosphates in six commercial samples of different manufacturing companies.¹

If a precipitate *has* formed, it must be collected on a small filter, washed and dissolved on the filter in dilute nitric acid; the acid solution of it has to be made slightly alkaline with ammonia water; the precipitate that hereby forms has to be redissolved in dilute acetic acid, and this solution has to be tested for orthophosphoric acid with a 5 per cent. silver nitrate solution. A canary yellow precipitate indicates the presence of orthophosphates.

(10) Where the text of the U. S. P. reads:

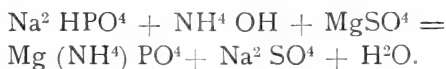
"If a portion of the filtrate be acidulated with acetic acid and heated to boiling,"

it should read, according to the proposition in this paper:

"If a portion of the filtrate from a precipitate, if any, is formed by the addition of the ammonium chloride and magnesium sulphate solution, or from the colorless filtrate mixed with ammonium chloride and magnesium sulphate, if no precipitate is formed"

¹Dr. Stieglitz detected, by taking much less magnesium sulphate, one (1) part orthophosphate in nine (9) parts pyrophosphate.

because very frequently we have to do with a mixture of ortho- and pyrophosphates.



(11) Neither Fresenius, Flückiger nor E. Schmidt mentions in their well-known respective text-books how sensitive the silver nitrate test is for orthophosphates. I do not know if this has been given elsewhere. Since it is valuable to know, from a pharmaceutical and chemical standpoint, "about" how much orthophosphates a silver solution detects, experiments were made—0.001 g. could be found. The reaction with molybdate solution is sensitive on orthophosphates in the fifth decimal place. Quantitative estimations of phosphoric acid are uncalled for.

"Wer dies aber wissen muss,
 Der kauft sich ein Fresenius."

(12) *Strongly acidulating* with hydrochloric acid and then adding magnesia mixture in *unlimited* quantity [see (7)] is another source of error. Fresenius teaches that magnesia mixture should not be used in too excessive quantities.

In one sample (No. 6), which was nearly pure pyrophosphate, five (5) c.c. magnesia mixture and one (1) c.c. ammonia water, gave a precipitate which did not visibly dissolve. *On the authority of the U. S. P., this sample would have, therefore, been condemned.* This precipitate gave a *white* color reaction with silver nitrate solution, after it was collected, washed, dissolved in dilute nitric acid, reprecipitated by ammonia and redissolved in dilute acetic acid.

It is repeated here that the pyrophosphate was "nearly" pure; that the precipitate did not visibly dissolve, because:

(1) The colorless filtrate of the mixture of the salt with potassium hydrate solution remained clear with two (2) c.c. of magnesia mixture and five (5) drops ammonia water, for a day. With 0.5 c.c. ammonia water, the same results.

(2) The molybdate test showed only traces of orthophosphoric acid.

(3) The experienced eye detected a yellowish tinge in the white silver precipitate, when a larger quantity of the silver solution was added after the first portion, whereby the white precipitate was thrown down.

I hope that this paper will be of some use to my colleagues, so that we may act harmoniously in the spirit of our law-book, which is purity of medicines, instead of being obliged to shield inferior products with its shortcomings.

AUSTRALIAN SANDARACH. —

BY J. H. MAIDEN.

(Issued by the Department of Agriculture, New South Wales, and communicated by the author.)

Introductory.—It is a matter of common observation that a number of raw vegetable products of more or less importance are going to waste in Australia, simply because our people are ignorant of their properties and value. I can hardly cite a better instance than that of Australian Sandarach. Here we have a product absolutely and entirely identical in chemical and physical properties with a well-known article in regular demand. The price of this article at London auction sales is shown by the figures I give below (Appendix A), while its cost in Sydney is very much enhanced; and yet we actually import from Algeria, via London, at this high price, what is common enough in parts of New South Wales, and to be had for the gathering. The trees from which this resin (for Sandarach is a resin) exudes are the well-known Cypress Pines of this Colony, some species of which are found in the coast districts and table-lands, but they are far more largely developed in the drier parts of the Colony.

The collection of Australian Sandarach is one of those minor industries which could be readily undertaken by a family of children. As the resin flowed from the Cypress Pines, it could be accumulated in clean dust-proof tins, until a sufficient quantity was obtained to be sold to the local store-keeper, who would again sell to the wholesale chemist, or wholesale oil and color-man of Sydney. Sandarach is usually graded. There would be no difficulty in grading locally our local product, while any surplus available for export could be shipped without grading if found expedient.

I have no means of getting at the consumption of Sandarach in this Colony, but we ought to be able to supply the local demand and have a good surplus for export.

With these introductory remarks, I will give some further information in regard to Sandarach and Australian Sandarach, based upon a paper "On Australian and Tasmanian Sandarach," written by me and published in the proceedings of the Royal Society of Tasmania in 1889. I do hope that educated men who may read what I have to say, and whose inclinations or duties carry them into districts where the native Cypress Pines grow, will take the trouble to encourage settlers and others to collect the product referred to.

Notes on Sandarach.—The Sandarach or gum juniper of commerce is the product of a *Callitris (quadrivalvis)*, which grows in North Africa. The following summary of its uses is taken from Morel (*Pharm. Journ.* [3] viii, 1024): "According to Gubler, the Arabs used it as a remedy against diarrhœa, and to lull pain in hæmorrhoids. The Chinese used one kind (*C. sinensis*) as a stimulant in the treatment of ulcers (as promoting the growth of flesh), as a deodorizer, and to preserve clothes from the attacks of insects. In Europe it is used very little in medicine. It is most frequently employed as an ingredient in varnish, to increase its hardness and glossiness. It is used also as a fumigant, and in powder ('pounce') to dust over paper from which the surface has been scraped, to prevent the ink from running. It rarely enters into the composition of plasters."

Ordinary Sandarach exudes naturally, but the practise in Northern Africa is to stimulate the flow, making incisions in the stem, particularly near the base, and this hint might be borne in mind by our people.

When our Cypress Pines are wounded, the resin exudes in an almost colorless, transparent condition. It has obviously high refractive power, and is much like ordinary pine resin in taste, smell and outward appearance, when the latter is freshly exuding. This transparent appearance is preserved for a considerable time, the resin meantime darkening a little with age. Old samples possess a mealy appearance, but this is merely superficial. The origin of this appearance has been explained as follows in regard to *Sandarach*, and doubtless the simple explanation holds good here: "The surface of the tears appears to be covered more or less with powder, but this character is not to be attributed, as alleged by Herlant (*Etude sur les produits résineux de la famille des conifères*, p. 38), to the friction of the fragments one against another; but, as has been

ascertained by a microscopical examination by Dr. Julius Wiesner (Die chemisch-technisch verwendte Gummiarten, *Harze und Balsame*, 1869, p. 129), to the unequal contraction of the resin while drying, resulting in a mass of fissures that form, as in the case of several kinds of copal, facets that gradually separate from the mass and constitute the 'powder' of many authors." (Morel, *op. cit.*) Evidence against Herlant's supposition is also found in the fact that resins of the *Sandarach* class are nearly *white on the trees* after they have been exuded some little time, showing that the appearance is brought about by exposure to the weather.

Australian Sandarach.—Australian Sandarach burns readily, and on the Snowy River (near the Victorian border) it is often mixed with fat by the settlers to make candles. The aborigines used frequently to use it for a similar purpose. Sir Thomas Mitchell (*Three Expeditions*, ii, 37) says: "Each carried a burning torch of the resinous bark of the *Callitris*, with the blaze of which these natives (Lachlan) seemed to keep their dripping bodies warm."

The *Callitris* resins soften slightly, but do not melt in boiling water, and a sample of commercial Sandarach behaves similarly. In the mouth they feel gritty to the teeth, and in no way different to Sandarach. When freshly exuded they are very irritating to a cut.

I will reiterate, at this place, in order to save time, that the properties of Sandarach are shared by Australian Sandarach; I do not know in what respect they differ, and the one article may be substituted for the other.

It was a specimen of resin from the Oyster Bay Pine of Tasmania, sent to the exhibition of 1851, which first drew the attention of experts to the possibilities of Australian Sandarach. For "the fine pale resin of the Oyster Bay Pine (*Callitris australis*) from the eastern coast of Van Diemen's Land" and other gums and resins, Mr. J. Milligan was awarded honorable mention (*Fury Reports*, 1851, *Exhibition*, p. 182).

I have only alluded to naturally-growing trees, but Baron von Mueller states: "Probably it would be more profitable to devote sandy desert land, which could not be brought under irrigation, to the culture of the Sandarach Cypresses than to pastoral purposes, but boring beetles must be kept off." Of course, Cypress Pine timber is very valuable, as it is ornamental, and one of the best of

our timbers to resist white ants, but I propose to confine myself to the resin in this paper.

The various kinds of Cypress Pines.—Our Cypress Pines all belong to the natural order Coniferæ (Cone-bearers), and are therefore allied to the pines, firs, spruces, etc., of the Northern Hemisphere. They belong to the genus *Callitris*, which is mainly a synonym of *Frenela*. [The word *Callitris* is from the Greek *Kallos*, beautiful, in allusion to the appearance of the trees. *Frenela* is in honor of M. Frenel, a former member of the French Academy.]

In the Australian Colonies there are twelve species of *Callitris*, and some of them have varieties more or less marked, so that there are a goodly number of Australian Cypress Pines. Four of the species (*Roci*, *Drummondii*, *Actinostrobus* and *acuminata*) are confined to Western Australia, and have, of course, but a limited interest to us in the eastern colonies. *C. oblonga* is only found in Tasmania.

The Cypress Pines that are found in New South Wales, and which therefore especially interest us, are seven, namely:

(1) *Callitris Macleayana*. "Port Macquarie Pine," an elegant species now often seen in gardens.

(2) *C. Parlatorei*. "Mountain Cypress Pine." "Stringybark Pine." These two species are closely allied, and are both found in the North Coast districts. They are not as abundant nor do they yield Sandarach as freely as the other species.

(3) *C. verrucosa*. The "White or Common Pine," often known simply as "Pine" or "Cypress Pine," but also as "Mallee Pine," "Rock Pine," etc. Well known under its name of "Murray Pine." It is the most widely diffused of all the Cypress Pines, being found in every one of the mainland colonies. It is easily known by its rather ornamental warted cones.

(4) *C. columellaris*. This is usually known as "Cypress Pine," and it attains a great size. It appears to be confined to the coast districts and moderate elevations of Northern New South Wales and Southern Queensland.

(5) *C. Muelleri*. "Baron Mueller's Cypress Pine," "Mountain Pine." This species is often very ornamental. Its range does not appear, at present, to be very well defined. I have collected it at Middle Harbor, Port Jackson, and in the Blue Mountains (Mount Victoria). It has been sent to me from the Illawarra. Mr. Baker has collected it at Rylstone in the Mudgee district.

(6) *C. cupressiformis*. Perhaps better known by its synonym of *rhomboidea*. This pine I believe to have been a good deal confused (in New South Wales) with the preceding. Of course, the cones are quite different. It is usually simply known as "Pine" or "Cypress Pine." It is extensively diffused in the coastal districts.

(7) *C. calcarata*. Better known under its synonym of *Frenela Endlicheri*. Everybody knows it under its name of "Red or Black Pine," whose timber is so largely used in the western parts of the Colony where white ants are prevalent. I need not further allude to the species here.

Of the above, *C. verrucosa* and *C. calcarata* will be found by far the most important from a commercial point of view, but the others all produce excellent Sandarach.

EXPERIMENTS ON SOME AUSTRALIAN SANDARACH OF VARYING QUALITY FROM VARIOUS SPECIES.

Having learned what sandarach is, and what Australian trees produce it, the following notes of observation and of incomplete experiments on definite Australian sandarachs will be interesting. To push the experiments further than I have done would be more of scientific than of economic interest.

My experiments tend to show this: Given similar circumstances in regard to size and age of tree, season of flow, climatic conditions, etc., the sandarachs from all the species are precisely similar in chemical and physical properties. Conversely it follows that if two specimens of sandarach are of different qualities, the explanation is to be found in the circumstances above enumerated. What is the best season to collect sandarach or to bleed trees in a particular district, is only to be learned by experience, and I think I have said enough to show that it is worth the trouble to try and find out.

Callitris verrucosa, R. Br. (Syn. *Frenela robusta*, A. Cunn). A sample of "Murray Pine" resin from Quedong, near Bombala, has a pale bleached appearance, much lighter than ordinary sandarach. Externally it has a very mealy appearance. Water has no effect on it. In rectified spirit, it almost wholly dissolves, leaving a little whitish resinoid substance. Petroleum spirit dissolves 5 per cent. of a perfect colorless and transparent resin.

Speaking of "Mountain Cypress Pine," or "Desert Pine" (*C. verrucosa*), the catologue of Victorian Exhibits, Colonial and Indian

Exhibition, 1886, states: "A sandarach in larger tears than ordinary sandarach is yielded by this species. It yields it in considerable abundance, 8 or 10 ozs. being frequently found at the foot of a single tree, but although this exudes naturally, the supply is stimulated by incisions."

"It is a transparent, colorless or pale yellow body, fragrant and friable, fusing at a moderate temperature, and burning with a large smoky flame; very soluble in alcohol and the essential oils, and almost totally so in ether; turpentine at the ordinary temperature does not act upon it, nor do the drying oils, but it may be made to combine with these solvents by previous fusion." (*Report on Indigenous Vegetable Substances, Victorian Exhibition, 1861.*)

This resin was used to make firm the union (after lashing) of the hardwood head to the reed in the making of reed spears by the aborigines of Victoria. The resin was called by them Bij-jin-ne. (Brough Smyth, *Aborigines of Victoria*, i, 306.)

A sample of New South Wales resin of this species is of a dark amber color, and, externally, possesses the dulled appearance found on lumps of amber. It is the darkest specimen of an Australian Sandarach hitherto examined by me. It almost wholly dissolves in rectified spirit, yielding a bright yellow liquid, leaving 2.5 per cent. of insoluble residue. Petroleum spirit removes 22.8 per cent. of a clear resin when the original substance is digested in it.

Callitris verrucosa, R. Br. (Syn. *C. Preissii*, Miq. partly). The following note by Dr. Julius Morel (*Pharm. Journ.* [3], viii, 1025) in regard to a specimen of South Australian resin, is interesting: "With Sandarach resin may be connected another resinous substance, which was exhibited in the Paris Exhibition of 1867, from South Australia, under the name of "Pine Gum." It is the resin of *Callitris Preissii*, Miq. The product resembles Sandarach, and might become an important article of commerce. . . . This resinous substance occurs in the form of slightly yellowish tears, thicker and longer than those of ordinary Sandarach. In consequence of unequal contraction it presents, like Sandarach, numerous facets, and, consequently, the surface appears to be covered with a white powder. In its transparency and hardness the resin corresponds to Sandarach. Its odor is very agreeable and balsamic, and the taste is bitter and balsamic."

Callitris columellaris, F. v. M. (Syn. *Frencela robusta*, A. Cunn; var.

microcarpa, Benth.). A sample of resin from this species dissolves almost entirely in rectified spirit, forming a pale yellow solution. The insoluble residue amounts to 4·6 per cent. Petroleum spirit, when digested on the resin, removes no less than 35·8 per cent. of a transparent, colorless resin. This is a remarkable percentage, and it would be interesting to inquire whether Australian Sandarach becomes increasingly soluble in that menstruum by age. An ordinary sample of commercial Sandarach yielded 8·9 per cent. to petroleum spirit.

Callitris cupressiformis, Vent.: "The Oyster Bay Pine of Tasmania," partly. This is the pine already referred to, and a brief account of the resin has been copied into many of the text-books. I have collected resin of this species from Port Jackson, clear and transparent as water. It turns pale amber-colored if placed in a bottle, but its brilliancy shows no sign of diminution in that time. The Sydney trees readily exude their resin on slightly wounding, and the same remarks apply to the Tasmanian.

Callitris calcarata, R. Br. (Syn. *Frenela Endlicheri*, Parlat). A sample of Red Pine resin from the Lachlan River has freshly exuded, and has the color and appearance of best selected Sandarach. Rectified spirit nearly wholly dissolves it, forming a beautifully clear, slightly yellowish liquid, with 1·3 per cent. of residue. Petroleum spirit extracts 22·1 per cent. of an apparently perfectly colorless and transparent resin.

APPENDIX A.

Gum Sandarach.

London, 11th May, 1892.—The market is very dull. At auction sale last Thursday a few packages sold, without reserve, at 59s. 6d. to 61s. for fair palish gum.

London, 16th September, 1893.—Sold cheaply to-day at a decline of about 3s. to 4s. for a parcel of 13 casks, offered without reserve; it brought from 72s. to 74s. per cwt.

London, 14th October, 1893.—A parcel of 12 casks sold cheaply, without reserve, at 65s. per cwt., one lot realizing 1s. more.

London, 25th November, 1893.—Nineteen casks sold very cheaply to day; ordinary dirty and dusty at 48s. 6d., medium quality at from 64s., rising to 69s. per cwt.

London, 3d March, 1894.—Seven casks, mostly oil damaged, sold, without reserve, with fair competition, at 41s. to 56s. per cwt.

The latest London quotation of a wholesale London firm is 125s. per cwt.

EDITORIAL.

THE AMERICAN PHARMACEUTICAL ASSOCIATION.

As stated on another page, the time of holding the next meeting of this Association, at Denver, Col., has been fixed for August 14th. It was first contemplated holding the meeting in June, and for some reasons this would have been satisfactory, but the latter month is one in which many State Pharmaceutical Associations are convened, and this would, no doubt, have been the cause of many members failing to reach Denver.

It was certainly demonstrated, in 1893, that August is a suitable month in which to hold the meeting of the National Association, and that it is by no means the most disagreeable month in which to travel.

PUBLIC MISUSE OF CARBOLIC ACID.

We have just received a circular, bearing the above title, from a committee of the Cleveland Pharmaceutical Association, which circular contains a valuable suggestion and considerable sound, practical sense.

The committee state that "carbolic acid, U. S. P., is in crystals; and not being convenient in this form for the household or medical use, it is made liquid by the addition of from 5 to 8 per cent. of water; when thus prepared, it does not strictly conform to the legal (U. S. P.) standard, yet by common usage it has become recognized by the public and by many physicians, erroneously, as true carbolic acid, and has been so labelled."

Since this conveniently liquefied acid apparently mixes with water, oils and other liquids, yet solution does not usually take place. The strong, milky or cloudy acid that remains undissolved acts as a powerful caustic instead of a healing agent.

"If directed to be mixed at home with oil, vaseline, lard or other fats, the liquefied acid will not dissolve on account of the 5 to 8 per cent. of water it contains, thereby resulting in caustic instead of healing actions."

"If swallowed by accident it is almost universally fatal before assistance can arrive; yet it is not desired or needed in so dangerous a liquid form."

"The Cleveland Pharmaceutical Association, having had its attention called thereto, and believing that it owes a duty to the public to prevent injury as far as possible without depriving the people of the proper use of a valuable drug, have devised and adopted a formula and label for carbolic acid for general dispensing purposes, which they hope will do away with much of the injury due to careless use, and respectfully request the co-operation of all pharmacists and physicians to that end.

FORMULA.

Take of carbolic acid crystals	16 troy ounces.
Glycerin	40 "
Melt the acid and stir in the glycerin.	

OR FOR PRACTICAL PURPOSES.

Carbolic acid	1 measure.
Glycerin	2 measures.

"This formula furnishes a 33 per cent. carbolic acid fluid. The label explains the rest. It is to be popularized as No. 33 carbolic acid, which indirectly instructs the physician as to the strength of the acid and indirectly enables him to tell what strength it is by its directions for making a practically 1 per cent. solution; thus also, by multiplying the amount directed, he can order a 1, 3, 4 or 5 per cent. solution, as desired.

"This No. 33 acid mixes readily with water or alcohol in all proportions, and not being as caustic, cannot result in as much mischief or fatality if taken accidentally or purposely.

"The Cleveland Pharmaceutical Association have unanimously decided to recommend :

"(1) To all druggists, and especially to their members, not to dispense a stronger carbolic acid than No. 33, except on physicians' prescriptions.

"(2) To all physicians, when desiring to mix carbolic acid with fatty bodies, instead of entrusting such dangerous work to the laity (since such work requires professional skill to suit each case), it will be the best entrusted to the proper professional expert—the pharmacist.

"(3) To all physicians requiring the liquefied carbolic acid as hitherto dispensed, to please specify this article in their prescriptions to avoid error and relieve the druggist of the responsibility for dispensing it, or of embarrassment for refusing to sell without prescription.

"(4) All druggists desiring electrotypes of the label may obtain them by applying to the committee.

NATHAN ROSEWATER,
P. I. SPENZER, M D.,
E. A. SCHELLENTRAGER,
EUGENE R. SELZER,
T. L. SORDS,

Committee."

The label which accompanies the circular designates the solution as "Strong Carbolic Acid, Fluid. No. 33." The antidotes are given and also the directions for making a 1 per cent. solution by mixing one tablespoonful of the solution with one pint of water.

We can subscribe to all of this circular, except the first recommendation, which is that druggists shall not dispense a stronger carbolic acid than No. 33, except in physicians' prescriptions.

We cannot recommend that any prescription or compound be suddenly reduced to one-third strength and dispensed without any legal authority. This is the kind of reasoning employed by those who sell weak laudanum.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Pharmaceutical and Medical Chemistry. A Text-Book of Chemistry intended for the Use of Pharmaceutical and Medical Students. By Samuel P. Sadtler, Ph.D., F.C.S., and Henry Trimble, Ph.M. J. B. Lippincott Company. 1895.

This is a compendious text-book of several branches of chemistry, filling nearly one thousand large octavo pages. Its issue, in these generous proportions, is an event of interest, as it will take a prominent place among one-volume publications bearing the title of pharmaceutical chemistry. Its authors are severally well known for their respective publications, and their conjoined names have therefore a favorable introduction to students and practitioners of medicine and of pharmacy.

The work furnishes ninety pages upon elementary physics, four hundred and thirty pages upon inorganic chemistry, two hundred and seventy-nine pages upon organic chemistry, and in ninety-six pages gives certain data for chemical and pharmaceutical analysis. The style throughout is direct, clear and easy; the treatment of subjects is that of simple explanatory statement, with little discussion of theory, and altogether without citation of authorities.

The presentation of physics, in its first principles, as a distinct introductory part, is a very commendable feature for such a general text-book as this is designed to be, because those students who have most used such general text-books have commonly neglected the use of any separate text-book of physics

for collateral reading. In Part I of this work the general and special properties of matter, and the laws of heat, light and electricity are outlined in brief. Such subjects as the use of the balance, the determinations of density, the principles of the microscope, spectroscope and polariscope are introduced, the limits of space not covering topics like the use of the refractometer, the modern studies of solution, etc. In a general treatise upon chemistry, the primary conceptions of physics are necessary to a clear understanding of the nature of chemical action, and the one study ought to be a companion to the other.

In Part II, devoted to the chemistry of the non-metals, directions are given for very simple practical exercises, that is to say, easy experiments, showing the character of the elements and the manner of chemical reaction. In this part, as well as in Part III, treating of the metals, the operations of industrial chemistry receive a good share of attention. Throughout these two inorganic divisions of the book, and also in the division of organic chemistry, the articles of the U. S. Pharmacopœia are announced in full type, and are described from the Pharmacopœia, as they are reached in the chemical order of the work.

The text for organic chemistry, in Part IV, is by necessity of space less ample in proportion to the extent of the subject, but the treatment is especially concise, and in quite full accord with the present state of organic research in its last results. For all simple and typical compounds the molecular structure is fully stated, and for representative types certain of the most important proofs of structure are given. The synthetic products used in medicine are described, both as to constitution and chemical properties. Certain of the more important series of organic compounds are tabulated with their physical constants. The carbohydrates are presented in the classification which has been adopted, following the work of Emil Fischer.

But statements of stereochemical isomerism seem to be avoided, except in a paragraph of the introduction. The subject of essential oils, camphors and resins is made rich in recent chemistry, and the text upon the alkaloids is very much more systematic and full than in most treatises upon organic chemistry, as, indeed, it might well be. The alkaloids have been huddled into closing pages of current chemical text-books as though they were a supernumerary residue of things merely dissected out of plants; and this for years after the results of Hofmann and Ladenburg, O. Hesse and E. Schmidt, Claus and Liebermann, among many, have been on record in literature as classic as any in the science. Finally, the manufacturing operations related to organic chemistry, the industries of fermentation, dry distillation, etc., are liberally presented in a way that is already familiar to the readers of the volume on industrial chemistry issued by one of the authors of this work a few years ago.

The compact analytical data in Part V include brief directions and tabulated schemes for qualitative work, selections for gravimetric and volumetric use, the latter with certain assay processes from the pharmacopœias. The work is in excellent print, upon the best of paper. The authors may be congratulated upon it.

A. B. PRESCOTT.

A STANDARD DICTIONARY OF THE ENGLISH LANGUAGE, VOLUME II. I. K. Funk, D.D., Editor-in-chief; F. A. March, LL.D., Consulting Editor; D. S. Gregory, D.D., Managing Editor; and the following Associate Editors: John Dennison Champlin, M.A.; Rossiter Johnson, Ph.D.; Arthur E. Bostwick, Ph.D. New York, Toronto and London. Funk & Wagnalls Company. 1895.

It has been just about a year since the first volume of this truly magnificent work was reviewed in this journal.

Two hundred and forty-seven editors, selected from the front ranks of English and American scholars, have been engaged upon this book.

About five years have elapsed since this work was undertaken, and \$960,000 were expended before a copy was offered for sale.

To give some idea of the advances made in the language in modern times, we may quote the following comparisons: *Johnson's Dictionary* contains 45,000 vocabulary terms; *Worcester's*, 105,000; *Webster's International*, 125,000; *Century* (six volumes), 225,000; *Standard*, 301,865, exclusive of the appendix, which contains 47,468 entries.

One of the attractive features of the work is the magnificent colored plates. That of the solar spectrum and typical colors is especially noteworthy.

Some of the titles are defined so as to be encyclopædic in character. As an illustration, we may mention the term *oils*, under which are given the name, source, use and properties of 337 different oils.

About four pages are devoted to the term *measure*; and *weight* receives a similar exhaustive treatment. Different systems under both of these titles are compared so as to be especially instructive.

The title, *pharmacy*, is defined as "the branch of materia medica that treats of the compounding of drugs and other substances for use in medicine, including also their collection, preservation and identification; the art or business of compounding and dispensing medicines." Those of us who claim that pharmacy is a profession cannot extract much consolation from such a definition.

Medicine comes off a little better as "the healing art; the science of the preservation of health and of treating disease for the purpose of cure." We can hardly agree, however, with the following statement: "Plants and minerals are the source of most medicines." Since the introduction of serum therapy and the flesh extracts, it is necessary to exercise caution in making sweeping statements, besides it is stretching a point to assign the origin of many of the new synthetic remedies to either plants or minerals; the source is too remote.

We have no wish, however, to find fault with what is undoubtedly the greatest dictionary of modern times. Its two volumes stand in strange contrast with the ponderous six-volume *Century Dictionary*, which does not contain as much information.

The reception given to the *Standard Dictionary* has been so universal and so enthusiastic that we feel sure it will become the standard for America, if not for all English-speaking countries.

The following prices will be of interest to many:

SOLD ONLY BY SUBSCRIPTION.

Single-volume Edition.

	Price.
Half Russia	\$12 00
Full Russia { With Denison's patent reference index } . . .	14 00
Full morocco { . . .	18 00

Two-volume Edition.

Half Russia	\$15 00
Full Russia { With Denison's patent reference index } . . .	17 00
Full morocco { . . .	22 00

MANUAL OF CHEMISTRY. By W. Simon, Ph.D., M.D. Fifth edition. Philadelphia, Lea Bros. & Co. 1895.

The demand for this work has necessitated the issue of another edition, and the author has taken the opportunity to thoroughly revise it and bring it in complete harmony with the new Pharmacopœia. The orthography recommended by the American Association for the Advancement of Science has not been fully adopted, for the reason that neither the leading chemical journals nor the United States Pharmacopœia use this spelling, and that it would be unwise to have the student confronted with two different systems of orthography. The foregoing statements of the author we can heartily endorse; the student should not be confronted with any more systems in anything than are absolutely necessary, least of all in the every-day matter of spelling. Let the Pharmacopœia lead.

What has been said of Dr. Simon's standard work in previous pages of this journal, we can fully subscribe to, and we can especially commend the unique colored plates, representing, as they do, sixty-four chemical reactions. One new plate has been added to the present edition, showing the chemical behavior of a number of the more important benzene derivatives.

SWEET CASSAVA: Its Culture, Properties and Uses. By Harvey W. Wiley. Bulletin No. 44, U. S. Department of Agriculture, Division of Chemistry.

An abstract of this interesting and valuable contribution will be given in a future number.

ETIDORHPA, OR THE END OF THE EARTH. The Strange History of a Mysterious Being, and the Account of a Remarkable Journey, as Communicated in Manuscript to Llewellyn Drury, who promised to print the same, but finally evaded the responsibility, which was assumed by John Uri Lloyd. With many illustrations by J. Augustus Knapp. Author's edition, limited. Cincinnati, John Uri Lloyd. 1895.

We have been allowed to see some proof-sheets of a work which is destined to figure conspicuously in the literature of both science and romance.

Professor Lloyd is well and favorably known as an experimenter and a writer on scientific subjects relating to pharmacy, but it will surprise some of his friends to know that he now appears in the rôle of philosopher and romancer. If it is feared by any one that the author, in assuming such a difficult part, has impaired his faculties for writing on pharmaceutical subjects, we venture to convince them of the contrary by pointing to his valuable paper on distilled water, which appears on p. 190, of this number of the JOURNAL, and which was prepared by him since his "Etidorhpa" went to press.

As we have not the whole work we reserve our decision, but feel safe in saying that it will be intensely interesting and at the same time instructive.

The following interesting contributions have been issued by the Department of Agriculture of New South Wales, and forwarded by the author, Mr. J. H. Maiden, of the Technological Museum at Sydney:

USEFUL AUSTRALIAN PLANTS. NO. 12—THE TURPENTINE-TREE. (*Syn-
carpia laurifolia*, Ten.). NO. 14—THE NEW SOUTH WALES BLUE GUM. (*Eucalyptus saligna*, Sm.).

GRASS TREE GUM. TAN SUBSTANCES (Canaigre).

THE CORKWOOD OR DUBOISIA. AUSTRALIAN SANDARACH (we reprint this last on page 214).

ÉTUDE DE NOUVELLES PLANTES MÉDICINALES NÉOCALÉDONIENNES. (A) *Résine de Gardenia*.—(B) *Gomme-résine de Garcinia*.—(C) *Produits des Sper-molepis (Chêne-gomme)*. Par MM. Édouard Heckel et Fr. Schlagdenhauffen.

The last one of these secretions is of especial interest on account of its richness in gallotannic acid. The following is given by the authors as its composition:

	Per Cent.
Gallotannic acid	79.73
Tauno-resin	19.50
Gum, coloring, albuminoids, salts	0.47
Crystalline substance	0.30
	<hr/> 100.00

The following interesting contributions have been received from the author, Professor Dr. A. Tschirch:

(1) F. A. FLÜCKIGER, Sonderabdruck aus den *Berichten der Pharmaceutischen Gesellschaft*.

(2) DIE KEIMUNGSGESCHICHTE VON MYRISTICA FRAGRANS, HOUT. *Sonderabdruck aus den Bericht. d. Phar. Gesell.*

(3) UNTERSUCHUNGEN UEBER DIE SECRETE. (10) UEBER DEN TOLUBAL-SAM. Von Paul Oberländer. *Sonderabdruck aus den Archiv der Pharmacie*.

(4) UEBER SECRETE UND SECRETBILDUNG. *Separatabdruck aus Pharm. Post*.

ANTISEPSIS AND ANTISEPTICS. By Charles Milton Buchanan, M.D. With an Introduction by Prof. Augustus C. Bernays. The Terhune Company, New-ark, N. J. 1895.

The 350 pages of this book treat of a very interesting subject in such a manner that it is not apparent at first sight that a part of it is a thinly-disguised advertisement of a certain antiseptic preparation manufactured by a St. Louis "chemical company." No doubt "up-to-date" prescribers are already ordering it, and the long-suffering pharmacist is already "stocking" with it, although under protest. "Sennine" is its name; it is a combination of phenol and boric acid, of such rare properties that it contains all the virtues of these two valuable agents, without any of their disadvantages. The formula by which this peculiar compound is obtained is not given.

THE ALKALOIDS, ALKALOIDAL SALTS, AND NEUTRAL PRINCIPLES OF THE UNITED STATES PHARMACOPŒIA. Compiled by Albert N. Doerschuk, Ph.G.

This is in chart form, and was originally issued as a supplement to the *National Druggist*, and copies may be obtained free by writing to that journal at St. Louis, Mo.

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE AMERICAN PHARMACEUTICAL ASSOCIATION.

WASHINGTON, D. C., March 18, 1895.

The Council has, by vote, named Wednesday, August 14, 1895, for the next meeting of the American Pharmaceutical Association, which is to be held in the city of Denver.

The arrangements for hotel accommodations and transportation have not yet been effected. As soon as completed they will be announced.

W. S. THOMPSON,

Chairman of the Council, American Pharmaceutical Association.

The best reason that can be given for becoming a member of the American Pharmaceutical Association is *because it pays*.

There is no initiation fee. The annual dues are \$5, payable after the election of a member, or, preferably, when application is made. There is no other expense connected with becoming and continuing a member than this \$5 per annum.

The American Pharmaceutical Association was founded forty-three years ago, the first meeting being held in the city of Philadelphia, on October 6, 1852.

Its aim was to unite the educated and reputable pharmacists and druggists of America in securing such objects as would elevate pharmacy. By united action, it has fully justified the designs of its founders; its roll contains the names of over 1,700 members, drawn from all parts of North America, some of the most distinguished exponents of the art and science having been enrolled.

Its objects appeal to no clique, section or faction, but it is, in the broadest sense, a national body. It has from the first encouraged and fostered State Pharmaceutical Associations, receiving delegates from these bodies, and extending to them aid whenever such was sought.

Among the many benefits received in return for annual dues, the first to be mentioned is the handsomely-bound volume of about 1,000 pages, issued annually gratis to members. It is called "The Proceedings," yet this term but remotely expresses the character and value of the work. True, it contains the proceedings of the annual meeting, which are of much interest to members, but it contains what is of greater value—the interesting discussions and extemporaneous remarks, as they drop from the lips of America's most eminent pharmacists and authors, besides all papers read during the meeting, embracing every class of subjects with which the pharmacist is concerned.

Of great practical value to every retail pharmacist is the "Report on Progress of Pharmacy," which is published in the volume of proceedings. This feature alone will give as great returns as can be derived from \$5 invested in works of reference. The formulæ are well worth the price.

With the continued growth of pharmacy in this country it has become of the utmost importance for all organized bodies to work in harmony, and it is earnestly hoped that the members of State Associations will strengthen the parent body and in turn receive the benefits which this powerful organization can bestow, by becoming members of the National Association. This may be done by filling out an application which can be obtained from Dr. H. M. Whelpley, 2342 Albion Place, St. Louis, Mo., Chairman of the Committee on Membership. Return the application with \$5 to Mr. Geo. W. Kennedy, Pottsville, Pa., Secretary of the Committee. The 1895 meeting will be held in that world-renowned health resort, prosperous city and hospitable convention place, Denver, Col., August 14th to 21st.

AMERICAN PHARMACEUTICAL ASSOCIATION.

ORGANIZED 1852. INCORPORATED 1888.

SECTION ON PHARMACEUTICAL EDUCATION AND LEGISLATION.

The Forty-third Annual Meeting.

DENVER, COL., August 14, 1895.

The Committee on Education and Legislation desires to present statistical information on these two important branches this year.

In order that the educational and legal status of pharmacy may be improved, it is deemed essential that the present requirements, as existing in over forty States, be summarized for ready reference and comparison. Secretaries of Pharmacy Boards, Colleges and other members are respectfully requested to transmit the information required for the subjoined queries at the earliest date for tabulation by the Secretary.

Papers on subjects considered by this section are urgently solicited and should be in hand, together with an abstract or synopsis, NOT LATER THAN JUNE 15th, that they may be printed for distribution at the meeting.

Kindly advise the Secretary of this Section as promptly as possible what contribution you intend to make.

Fraternally,

JAMES M. GOOD, *Chairman*,
2348 Olive Street, St. Louis, Mo.

JAMES H. BEAL, *Associate*,
Scio, O.

CARL S. N. HALLBERG, *Secretary*,
358 Dearborn Street, Chicago, Ill.

Chicago, Ill., March 1, 1895.

THE PITTSBURG COLLEGE OF PHARMACY.

The subscribers to the fund for the new Pittsburg College of Pharmacy building met on Thursday, February 21st, in the Chamber of Commerce rooms, for the purpose of forming a permanent organization.

The officers elected were : Wm. G. Schirmer, President ; Theodore E. Ihrig, Recording Secretary ; Joseph P. Urben, Treasurer ; and S. S. Holland, Louis Emanuel and A. J. Kaercher, Vice-Presidents.

Prof. F. T. Aschman, Louis Emanuel and E. A. Schaefer were appointed a committee to draw up a constitution and by-laws.

One of the objects of the organization is to form a Druggists' Club for the furtherance of social and trade interests. It is hoped that all the druggists in the county will become members of the club, which will own and control the proposed new College building, which will contain the rooms of the Association also. By thus forming a club with a financial standing it is hoped that much can be accomplished in the way of relieving the present evils of the trade.

The following committee was appointed to solicit membership : John C. Smith and Richard Mierzwa, Lawrenceville ; George L. Bimber, South Side ; T. Ray Wirsing, Sharpsburg ; C. E. Steunz, Mt. Washington ; B. P. Welsch, Charles F. Walther and J. F. Neely, Allegheny ; D. B. Kahle, New Kensington ; C. A. Givens, McKee's Rocks ; Otto Friebling, East End ; A. F. Judd, Beaver Valley ; W. C. Martin, Homestead ; Howard Jackson, Wilkinsburg ; Adolph Schmidt, McKeesport ; Joseph M. Dodds, Braddock.

STATE BOARD OF PHARMACY, ILLINOIS.

At a meeting of the State Board of Pharmacy, Illinois, held February 12, 13, 14, 15, 19, 20, 21, 1895, for examination, 141 applicants were present, out of which 34 passed the examination for registered pharmacists.

The next meeting of the Board will be held in Chicago, April 16, 1895, at 173 Thirty-ninth Street. All applications must be on file in the office at Springfield on or before April 13, 1895. Applications will not be received the day of the meeting. Address all communications to Springfield.

FRANK FLEURY, *Secretary*,
Springfield, Illinois.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, March 19, 1895.

On motion of Professor Trimble, Wm. McIntyre was asked to preside.

The Registrar presented, on behalf of the publishers, through the JOURNAL OF PHARMACY, to the library a copy of the Standard Dictionary of the English Language, volume II, published by Funk & Wagnalls, and a copy of Sadtler & Trimble's completed text-book of Medical and Pharmaceutical Chemistry. They were received with the thanks of the College.

A paper was read by Mr. C. H. La Wall on the *Chlorinated Compounds of the United States Pharmacopœia*. After reading, a discussion which followed showed that the chlorinated line, which is one of the most used chlorinated compounds, deteriorates faster by moisture than by any other cause, and that heat, if it be not above 70° F., exerts but little deleterious influence upon it. The general opinion was that *liquor sodæ chloratæ* was better made by the formula of 1880 Pharmacopœia than by that of 1890.

Mr. W. E. Ridenour read a very interesting paper upon the *Chemical Characteristics of the Various Kinds of Cacao Beans of Commerce*. The paper was the occasion of a number of queries relative to the best cocoa for soda water and dietetic uses, and whether the chemicals used by some changes the character of the cocoa.

The flavor of cocoa of the Caracas is generally more highly esteemed than other varieties. The Dutch prepared chocolate has a larger percentage of ash.

The question was asked whether the Kola nut is used to any extent for fabrication of chocolates.

The papers were referred to the publication committee.

Professor Trimble inquired whether there was any demand for Loeffler's Toluol Solution for diphtheria. The reply was that the druggist should make it and let doctors know they had it.

Mr. Kebler asked if any members present had experienced unpleasant effects on their eyes from handling and examining saffron. The inquiry was made as to the variety of saffron handled, as there are so many substances and adulterations in saffron. Mr. Beringer said that the ash of saffron retained the shape of plant unchanged. Mr. Kebler also asked what should be sold as *black sulphur*. That commonly sold is black sulphide of antimony and flowers of sulphur. Another article examined proved to be metallic iron, crude sulphur and earthy matters; another carbonate of calcium and coal dust. Sulphur

vivum, the residue from sublimation of sulphur, reduced to powder, is also known under this name.

It was suggested that Mr. Kebler furnish the next meeting with a paper upon this subject.

White sulphur was also inquired about. This is usually precipitated sulphur made by precipitating sulphur with sulphuric acid instead of hydrochloric acid, thus contaminating it with sulphate of calcium.

Adjourned.

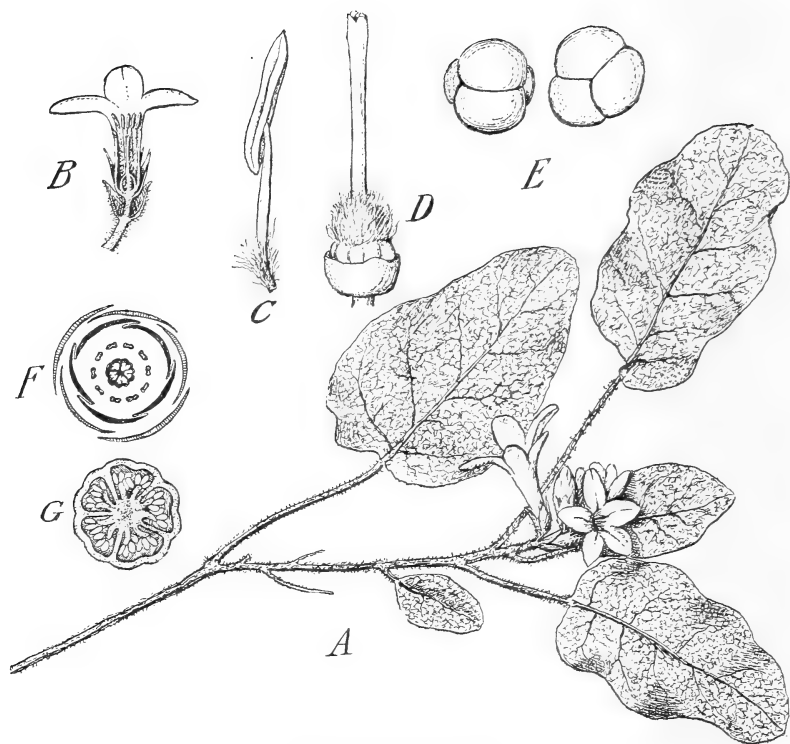
T. S. WIEGAND, *Registrar*.

OBITUARY.

CHAS. BRADFORD HUNTERSON, PH.G.

Chas. Bradford Hunterson, Ph.G., Class of 1881, was born in Philadelphia, Pa., October 12, 1860, and died at his residence, 1828 Frankford Avenue, Philadelphia, Pa., December 9, 1894, in his 35th year, of pleura pneumonia. He received his early education in the public schools of Philadelphia, and went to Pottsville, where he spent four years and finished his education, after which he returned to Philadelphia and entered the employ of Dr. Clement B. Lowe, Ph.G., corner Ninth and Vine Streets, and remained about one year, after which he went with Wm. Wilson, Montgomery Avenue and Thompson Streets, with whom he remained until he finished the drug business. While with the latter he attended the Philadelphia College of Pharmacy with the class of 1881. After his graduation he entered the employ of Lancaster Thomas, corner Nineteenth and Pine Streets. In 1886, he purchased the drug store, 1828 Frankford Avenue, corner Vienna Street, which he occupied up to the time of his death. In 1891, he was elected a member of the Executive Board of the Alumni Association, and continued a member up to the time of his decease. He was an active member of the Northeast Branch of the Young Men's Christian Association, and took a great interest in the erection of their new building, assisting in the collecting of the funds for that purpose, and was elected its Treasurer, which position he held up to the time of his death. He was also an active member and one of the Trustees of the Bethesda Presbyterian Church. He was married in 1888 to Miss Porter, daughter of the Hon. Jas. Porter, of Camden, N. J., who survives him, with two children. A sad feature of his death was the loss of a younger brother just two weeks previous, with the same disease.

W. E. K.



EPIGÆA REPENS.



THE AMERICAN JOURNAL OF PHARMACY

MAY, 1895.

STRUCTURE OF EPIGÆA REPENS.

BY EDSON S. BASTIN.

The "first sweet smiles of May," as Whittier calls the flowers of this plant, prettily portray the fact that they are at once among the earliest and the most prized of our spring floral treasures.

In most localities where the plant is known it is called the Trailing Arbutus, but in Massachusetts and some other portions of New England it is commonly called the Mayflower, partly, perhaps, in allusion to its time of blossoming, and partly to the fact that it was the first flower to gladden the eyes of the Pilgrims in the spring after their first winter on the bleak shores of their new home.

The plant is widely distributed over the northeastern part of North America, but is especially abundant in the region of the Alleghenies and in the pine and fir-clad regions bordering the Great Lakes and the St. Lawrence River. It particularly affects rocky hill slopes, where the soil is light and well drained, but is not infrequently found on lower-lying sandy, tree-clad areas, where the soil is well aerated. The sturdy little plant also prefers the vigorous north, and is seldom found south of the line of the Ohio River, save in the more elevated portions of the Alleghenies. Its stems are prostrate, and the slender trailing branches often attain a foot in length, and possess, like the petioles and the under surfaces of the leaves, a copious growth of rusty-brown, multicellular, but simple hairs. These also occur, but much more sparingly, on the upper surface of the leaves. The leaves are evergreen, veiny, scarcely

coriaceous, deep green above, from 3 to 6 cm. long, elliptic in outline, ciliate-margined, cordate, or sometimes rounded at the base, cuspidate at the apex, exstipulate, but provided with petioles which are nearly as long as the leaf blades.

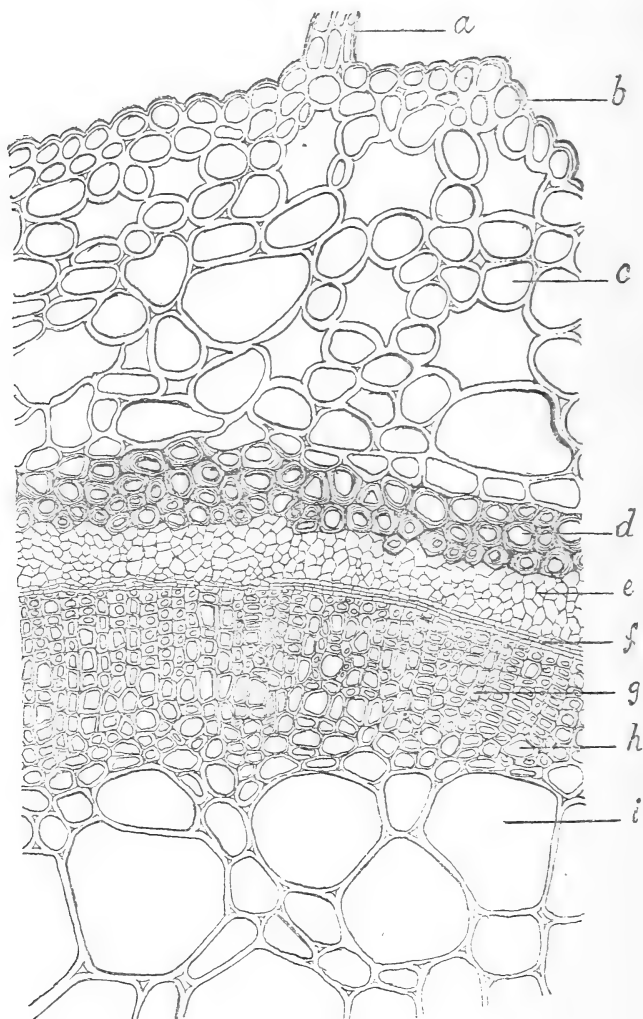


FIG. 1.

The fragrant flowers are arranged in short, almost spike-like racemes at the ends of the stems, and when they unfold in the spring are often quite concealed from view by dead leaves which

have fallen from the overhanging trees. The flowers are white or rose-tinged, and attain a length of $1\frac{1}{2}$ or 2 cm. The pedicels are only two or three mm. long, and covered with rusty-brown hairs, as are also the scaly bracts which subtend the flowers. The calyx is deeply five-parted and the segments are erect, lanceolate, entire, nearly smooth, about the length of the corolla tube, pointed and scale-like. The corolla is hypogynous, salver-shaped, and the lobes of its five-parted limb are ovate, entire, obtuse or mucronate, and alternate with the segments of the calyx. The tube is hairy on its

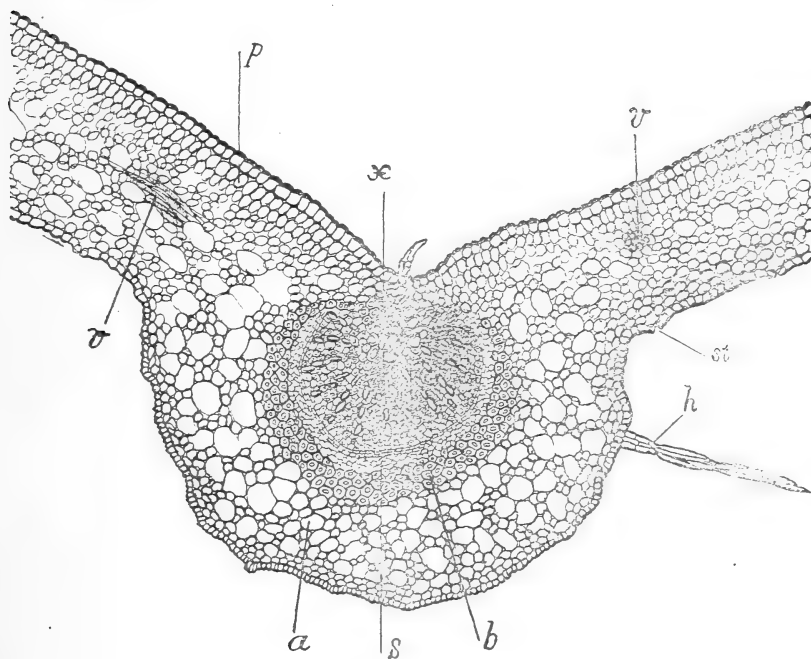


FIG. 2.

interior. The androecium consists of ten stamens, as in most other Ericaceæ, and they appear to be in but one whorl, though probably this is the result of a condensation from two.

The flowers, according to the investigations of Prof. W. P. Wilson, are really diœcious, though most of them still possess both stamens and pistils. In the pistillate flowers, which are rose-colored, the stamens have sometimes completely disappeared, though in most instances they are still present, but functionless and smaller than they are in the staminate white flowers. The staminate flowers differ

from each other also, some having long stamens, others short ones, and still others those of intermediate length. There is a corresponding difference also in the length of the styles. The history of the flower, then, according to Prof. Wilson, is as follows: It was at first hermaphrodite, and the flowers of the species all had the same form. It then became dimorphous, later on trimorphous, and finally the stamens in some flowers and the pistils in others became abortive, as is the case with the species at the present time. It may therefore be safely predicted that in the process of evolution still going on the last vestige of stamens from the pistillate flowers, and of pistils from the staminate ones, will ultimately disappear.

The insertion of the stamens is, as in most other Ericaceæ, on the receptacle, and not on the tube of the corolla, differing thus from most other gamopetalæ, in which they are adnate to the tube of the corolla. The filaments are bearded at the base and alternate toward the apex. The anthers are introrse, versatile, 2-celled, and differ from those of the majority of the family in the fact that they dehisce longitudinally rather than by means of apical pores.

The pollen grains also differ from those of most other plants outside this natural order in the fact that each is composed of a group of four cells.

The pistil is 5-carpeled, the ovary faintly 10-lobed exteriorly, 5-celled interiorly, with an axile placentation and very numerous ovules. The style is erect, unbranching and crowned, in the pistillate flower, with a star-shaped, 5-rayed stigma. The stigmas of the staminate flowers are also 5-lobed, but the lobes never open.

A study of the cross-section of the stem shows such a structure as that drawn in *Fig. 2*; a small-celled epidermis, a loosely-arranged cortical parenchyma, whose cells vary greatly in size, a zone of well-developed bast-fibres in the outer phloem, a narrow zone of wood with a rather large pith composed of parenchyma cells, some of which are small or moderate in size, others relatively very large.

A cross-section of a leaf near its base shows the vascular area constituting the midrib to possess an outer crescent-shaped mass of bast-fibres, the horns of which are presented toward the upper surface of the leaf. Lining this is a thinner crescent of soft bast, which in turn includes a short, thick crescentic mass of xylem tissues. The latter shows a distinct radial arrangement of its elements, and these

rays focus upon a small area of parenchymatous tissues included between the horns of the inner crescent. This parenchyma, the xylem tissues, and the bast-fibres, in the mature leaf, are all strongly lignified. Exterior to the crescent-shaped area of bast-fibres is a region of loosely-arranged parenchyma enclosing the bundle, except on its upper side, and extending nearly to the epidermis below, and laterally to form the spongy parenchyma of the thin portions of the lamina. This parenchyma is quite similar in appearance to that composing the pith of the stem.

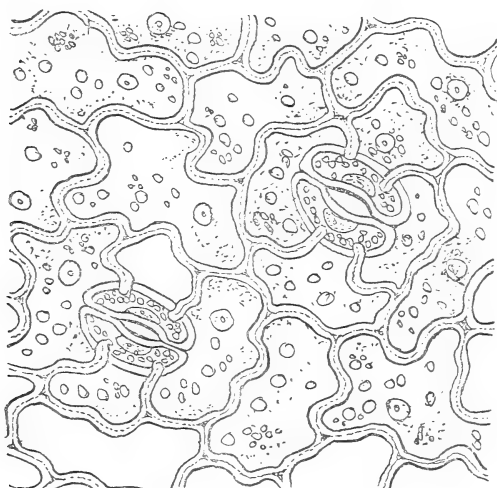


FIG. 3.

The epidermis is one-layered and rather small-celled, and the cells of the lower are smaller than those of the upper epidermis. The cuticle is thinner than that of most evergreen leaves. The rather compactly-arranged chlorophyll-bearing cells which face the upper epidermis differ from most palisade tissue in being but slightly lengthened. There are two or three layers of these cells.

The ordinary epidermal cells, in surface view, appear strongly wavy in outline, or lobed, and there is little difference of shape between those of the upper and those of the lower face of the leaf. Stomata occur also on both surfaces, but are more abundant on the lower.

DESCRIPTION OF FIGURES.

Frontispiece.—Trailing Arbutus.

A.—Flowering shoot about three-fourths natural size.

B.—Vertical section of a flower.

C.—Stamen, much enlarged.

D.—A pistil, also much enlarged.

E.—Pollen grains.

F.—Ground plan of flower.

G.—Enlarged view of cross-section of ovary, showing axile placentation.

[The above drawings are reproduced from the author's *Laboratory Exercises in Botany*.]

Fig. 1.—Portion of cross-section of stem magnified 230 diameters; *a*, base of one of the hairs; *b*, epidermal cell; *c*, cell of loosely-arranged cortical parenchyma; *d*, bast-fibres; *e*, soft bast; *f*, cambium zone; *g*, medullary ray; *h*, duct in xylem; *i*, one of the large parenchyma cells of the pith.

Fig. 2.—Portion of cross-section made near base of leaf of *Epigæa*. Magnification 75 diameters; *p*, palisade tissue, composed of cells scarcely elongated; *h*, a hair; *st*, a stoma; *v*, section of a veinlet; *b*, bast-fibres; *s*, soft bast; *x*, duct in xylem; *a*, spongy parenchymatous tissue composed of large and small cells.

Fig. 3.—Small portion of lower epidermis of leaf magnified 560 diameters, showing ordinary epidermal cells and stomata.

SOME DERIVATIVES OF CHIMAPHILIN.

BY W. E. RIDENOUR, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 139.

Chimaphilin is a crystalline, neutral principle, obtained from *Chimaphila umbellata*, Nuttall, and *Chimaphila maculata*, Pursh.

It was first described by Samuel Fairbanks (*Four. and Trans. Md. College of Pharm.*, 1860, or *AMERICAN JOURNAL OF PHARMACY*, 1860 p. 254), who obtained it by distilling the drug of the former species with water. E. S. Beshore (*AMERICAN JOURNAL OF PHARMACY*, 1887, p. 125), was the next to investigate *Chimaphila umbellata*. He prepared chimaphilin by Fairbanks' process. He also extracted the dried drug with petroleum ether, and in the percolate found another crystalline principle, which melted at 236° C. Upon ultimate analysis he found its composition to be $C_{10}H_{19}O$. He believed it to be the active constituent of the drug.

In 1892, J. C. Peacock published in this *JOURNAL*, p. 295, the account of an investigation of both species. He showed that

chimaphilin was obtainable from dry *Chimaphila maculata*, and, besides isolating it from both species by the method of Fairbanks, he extracted it by percolating the dried drug of the *C. umbellata* with petroleum ether. The crystals so obtained, after repeated crystallization, were found, by him, to melt between 113° and 114° C., and to have a composition represented by the formula $C_{24}H_{21}O_4$.

The same investigator also found three other crystalline principles, which were designated—according to their appearance—as matted crystals, melting at 153° C.; tufted crystals, having a melting point of 166 – 167° C.; glistening crystals, not melting at 250° C.

This work of investigating the derivatives of chimaphilin was undertaken at the suggestion of Professor Trimble, and was conducted under his direction.

The chimaphilin used in these experiments was procured by distilling water with the coarsely-ground *Chimaphila umbellata* of the market. The crystals were collected from the condenser and the light yellow distillate. The color, odor and taste of the latter suggesting the presence of dissolved chimaphilin, it was accordingly shaken with ether, which removed all color, and, upon evaporation, left a very small quantity of chimaphilin, and some volatile oil of a strong odor.

When freshly isolated, the crystals had a melting-point of 109° C. By recrystallization from alcohol of specific gravity $\cdot 820$, and, through precipitation of a concentrated alcoholic solution with water, the melting-point was raised to 114° C.

The solubilities of the principle were found to be the same as those assigned it by former investigators.

When applied in the dry state to the skin, the crystals produced, after a few minutes, a burning sensation, which became quite intense. That the identity and purity of the crystals might be further proven, they were submitted to ultimate analysis, the result of which is compared with the composition assigned the principle by Peacock.

	Found. Per Cent.	Calculated for $C_{24}H_{21}O_4$ Per Cent.
Carbon	77.30	77.21
Hydrogen	5.76	5.63
Oxygen	16.94	17.16

From this purified chimaphilin the following compounds were prepared:

CHLORINE DERIVATIVE.

Pure dry chlorine gas was conducted through a solution of the crystals in absolute ether. The reddish-yellow color of the solution gradually became paler, until at the end of three hours it retained but a light yellow tint.

Nothing was deposited from the solution so treated, but, upon the spontaneous evaporation of the ether, tufts of light-yellow-colored, needle-shaped crystals remained. They melted between 93° and 94° C., thus showing their difference from chimaphilin. They were soluble, to some extent, in a 10 per cent. solution of potassium hydrate, to which they imparted a faint pink color, which, upon heating, changed to yellow. When their solution in potassium hydrate was acidified with nitric acid and tested with silver nitrate, a distinct precipitate of silver chloride was obtained. The action of ammonium hydrate was similar to that of potassium hydrate.

A combustion of the derivative (silver-foil being used to absorb the chlorine), afforded the following figures:

Carbon	54.33 per cent.
Hydrogen	4.63 "

To estimate the chlorine, a mixture of the derivative and calcium carbonate was heated to redness in a piece of combustion tubing for one hour. The tube was allowed to cool, then broken, and its entire contents treated with water, and afterwards with nitric acid in excess. The solution was filtered from the fragments of glass, and completely precipitated with silver nitrate. The resulting silver chloride was collected, washed, and subsequently dried at 130° C. Its amount indicated the presence of 28.22 per cent. of chlorine in the derivative.

It would therefore appear, from the results obtained by analysis, that this compound is a tetra-chlor addition product of $C_{24}H_{21}O_4$, and, for convenience of comparison, the matter may be tabulated as follows:

	Found. Per Cent.	Calculated for $C_{24}H_{21}O_4Cl_4$ Per Cent.
Carbon	54.33	55.92
Hydrogen	4.63	4.07
Chlorine	28.22	27.57
Oxygen	12.82	12.44
	<hr/> 100.00	<hr/> 100.00

A bromine derivative was made by adding an ethereal solution of bromine to a solution of chimaphilin in ether. The addition was continued as long as the color of the bromine disappeared. The derivative formed tabular crystals, which underwent decomposition when exposed to the air.

ACTION OF ACETIC ANHYDRIDE.

A quantity of chimaphilin was boiled with acetic anhydride for four hours. When the resulting solution was poured into water, a crystalline precipitate, having the appearance of the original chimaphilin, was produced. A melting-point determination, the complete volatilization and the sublimation of the precipitated substance, proved the correctness of that opinion.

ACTION OF NITRIC ACID.

Chimaphilin was dissolved in chemically-pure nitric acid, of specific gravity, 1.42. The solution was kept in a water-bath, at a temperature of 90° C., for one hour. During this time, red fumes were emitted. The resulting liquid, when allowed to cool, separated a mass of lemon-yellow tabular crystals. These were collected and washed with water. Another lot of the same crystals was obtained by evaporating the solution to dryness on a water-bath.

After several recrystallizations from absolute ether, the crystals were found to melt to a red-brown liquid at a temperature of 153° to 154° C. When recrystallized from alcohol, a decomposition into resinous substances, incurring great loss of material, took place. The product of the action of the nitric acid was somewhat soluble in a 10 per cent. solution of potassium hydrate, producing therewith a reddish-yellow liquid. This color was destroyed by strong acids, but it was not restored by the addition of alkali in excess.

The action of ammonium hydrate was similar to that of the fixed alkali.

A combustion of the product showed the following results :

Carbon	63.64 per cent.
Hydrogen	6.57 "

Both silver-foil and copper-turnings were used in the tube, to insure the decomposition of the oxides of nitrogen.

An estimation of nitrogen by the soda-lime method showed 1.70 per cent., while one by the Kjeldahl method indicated 2.19 per cent. of the element.

These results seem to indicate that the compound was a nitro-derivative of an oxidation product of chimaphilin.

Fairbanks stated that concentrated nitric acid did not affect the crystals of chimaphilin, while Peacock reported that they dissolved in nitric acid, and were precipitated, apparently unaltered, by the addition of water.

The residue of *Chimaphila umbellata*, from which the water had been distilled to obtain the chimaphilin, was dried and afterwards percolated with petroleum ether. This solvent extracted a considerable quantity of green coloring matter, and a small amount of a granular substance. The amount of the latter seemed to increase in the percolate as the drug came nearer exhaustion of the coloring matter.

The greater part of the petroleum ether was recovered from the percolate, which subsequently, upon cooling, separated the granular substance mentioned. When cool, the liquid portion which retained the green color was filtered off. Trial having shown that the granular substance upon the filter was but sparingly soluble in alcohol, it was washed with that liquid to remove traces of green color.

It was found best to recrystallize the principle by the spontaneous evaporation of its chloroformic solution—a plan that was adopted, and by means of which colorless, many-sided crystals were obtained. These crystals possessed little or no taste, but produced a burning sensation when their chloroformic solution was applied to the skin. They did not melt at 250° C. When carefully heated on platinum foil, they fused to a clear liquid and sublimed, apparently unchanged, passing off as white clouds.

When rapidly heated, the crystals burned with a smoky, luminous flame, and were entirely consumed.

Benzol, like chloroform, readily dissolved the crystals, while ether, absolute alcohol and petroleum ether, showed slight solvent power only.

Purification seemed to have decreased their solubility in the last liquid.

This principle was obtainable from both the stem and the leaf of the plant.

Though melting at a temperature distinctively different from that recorded by Beshore for the substance discovered by him, and to

which he gave the formula $C_{10}H_{19}O$, this principle showed so much resemblance in solubility to the same, that a combustion was deemed necessary to prove or disprove their identity.

The results of such analysis were :

	Average Found. Per Cent.	Calculated for $C_{10}H_{19}O$ Per Cent.
Carbon	77'53	77'42
Hydrogen	11'25	12'25
Oxygen	11'22	10'33
	<hr/> 100'00	<hr/> 100'00

By not melting at $250^{\circ} C.$, by corresponding solubility, and by some general properties, the principle also showed a similarity to the "glistening crystals" described by Peacock; but as the result of a combustion of the same, he reported several per cent. more of carbon than the writer found.

A collection of the species *maculata* was made on November 12, 1894, near Haddonfield, New Jersey. About 1 kilo. of the whole plant was at once macerated with water, which was distilled off without delay. Crystals of chimaphilin were obtained in the distillate. Peacock (*vide loc. cit.*) did not obtain chimaphilin from fresh *Chimaphila maculata* gathered in the same locality in July, 1891.

His reason for stating it absent was that "no solid separated in the condenser, nor in the distillate, even upon allowing the latter to stand for a month." In view of the fact that chimaphilin is slightly soluble in water, and under the circumstance of no mention by him of having shaken the distillate with ether or other solvent to separate the small amount that is soluble, such traces might have escaped his notice. Upon allowing another portion of the same collection to dry in the air of a room for forty days, he was enabled to detect the principle by the usual method.

Some *Chimaphila umbellata* was gathered at St. Davids, Pennsylvania, on December 12, 1894. Crystals of chimaphilin were obtained when the fresh drug was subjected to the usual distillation process. From the difference in the experience of Mr. Peacock and the writer, the latter is led to believe that the amount of chimaphilin present in the fresh herb depends upon the time of collection.

The writer is much indebted to Messrs. Peacock and Manger for the *Chimaphila umbellata*, from which the chimaphilin was prepared.

BLACK SULPHUR.—

BY LYMAN F. KEBLER.

SYNONYMS.—*Native sulphur, sulphur vivum, horse brimstone, crude sulphur, sulphur nigrum, and Magnus "black sulphur."*

Black sulphur was first mentioned¹ by Magnus in 1854, and again studied² in 1856 by the same worker. As is well known, a portion of the sulphur that has been melted and allowed to cool is incompletely soluble in carbon disulphide. This residue, after repeated melting and extracting with carbon disulphide, constituted Magnus' first "black sulphur." It was subsequently prepared, by the same investigator, by mixing sulphur with a very little oil, soot or charcoal and fusing; a bluish black, soft, plastic mass resulted, which was only partially soluble in carbon disulphide. Magnus did not consider it an allotropic form of sulphur, but a special modification.

A number³ of investigators have contributed to the knowledge of black sulphur, but it was left for Fr. Knapp to exhaustively study the subject. He studied the conditions under which the largest per cent. is produced, as well as the most uniform product formed. Black sulphur is evidently not a modification of sulphur, but consists of a carbonaceous mixture which forms a nucleus, affording a surface for the adhesion or condensation of the sulphur, or the carbonaceous material in some manner occludes the sulphur. Whatever may be the facts, a uniform product is hard to prepare.

As a rule, pharmacists have a vague conception of what black sulphur is, if they know anything about it. Some think it is a mixture of sulphur and antimonious sulphide; others say it may be Ethiops mineral, or sulphureted antimony, depending on what it is to be used for.

What are the real facts concerning its composition? The writer has been able to secure only three samples from many drug stores. Below are the results of the investigation of these samples.

(1) Sulphur 81.58 per cent.; antimonious sulphide, 12.68 per cent. sand and earthy matter, 5.74 per cent.

¹ 1854, *Pogg. Ann.*, 92, 308.

² 1856, *Pogg. Ann.*, 99, 145.

³ 1865, Dietzenbacker, *Pogg. Ann.*, 124, 644.

1879, T. Gross, *Berliner Akademie-Berichte*, 783.

1880, H. C. Jones, *Chem. News*, 41, 244.

1888, *J. prakt. Chem.*, (2) 38, 48, and 1891, *Ibid.*, (2) 43, 305.

(2) Ground limestone, 53.00 per cent.; coal-dust, 47.00 per cent.

(3) Sulphur and other combustible matter, 57.09 per cent.; metallic iron, 17.91 per cent.; sand and earthy matter, 25.00 per cent. From number three, by repeated extractions with carbon disulphide, the writer succeeded in extracting 39.13 per cent. of sulphur. It was not all extracted, however. What a heterogeneity the above results present!

These few words are presented here solely with the view of bringing about a unity on black sulphur. The writer would be pleased to receive any information on this subject by any pharmacist meeting this article. Your opinions regarding the composition of black sulphur is especially desired. The results, if any, will be made known in this journal at some subsequent date.

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ARTIFICIAL OIL OF WINTERGREEN.

BY HOUSTON T. THAYER, PH.G.

The subject of this paper was one of the organic compounds by the production of which synthetical chemistry first showed itself to be a rival of Nature's mysterious functions. And as, under the name of methyl salicylate, it is a prominent member of the list of articles added to the Pharmacopœia at the last revision, a practical process for its preparation would seem to be of interest to the pharmacist who might wish to make his own supply.

The method of producing it long in use is that described in works on chemistry as consisting of the saturation of a solution of salicylic acid in methyl alcohol with hydrochloric acid gas, and of subsequent purification, either through distillation of the mixture by the aid of steam or by repeated washing with water.

In following this outline without taking the precaution of drying the hydrochloric acid gas, the availability of the process is not likely to be recognized, as the salicylic acid separates as a solid, and for that reason does not easily combine with the methyl alcohol.

Some authorities, however, direct the use of sulphuric acid with which to digest the salicylic acid and methyl alcohol, instead of the usual treatment with hydrochloric acid gas.

On p. 8 of THE AMERICAN JOURNAL OF PHARMACY for 1887, Charles Bullock published, under the title of "Synthetical Oil of Gaultheria," the following process:

Salicylic acid	½ oz.
Methyl alcohol, absolute	2 fl. ozs.
Sulphuric acid	1 fl. oz.

Dissolve the salicylic acid in the alcohol; then add gradually the sulphuric acid; warm gently during twenty-four hours; then distil from a retort, into which a current of steam is introduced. The distillate is to be well washed and separated by decantation.

The product afforded by this process has, when recently prepared, a rank odor, but it is said in the article cited that the odor "improves by keeping."

Although the writer does not object to the use of absolute methyl alcohol, he is of the opinion that it adds unnecessarily to the cost of the oil, because such an article is obtainable only by the expenditure of much work and time—items of significance scarcely expected to be compensated by any probable superiority of the product over that obtained when a methyl alcohol of reasonable purity is employed.

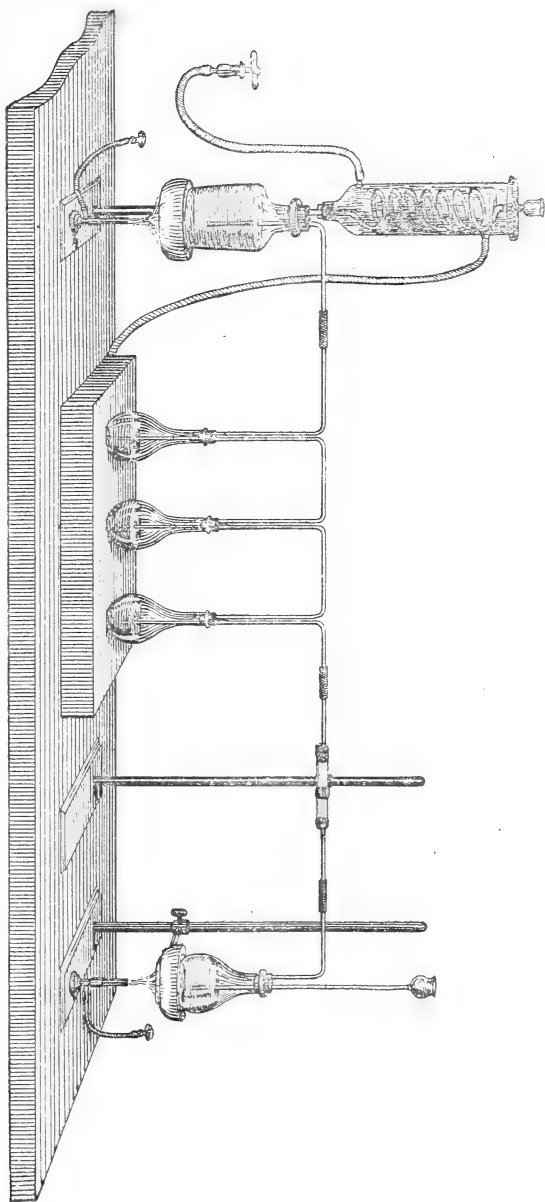
In the contribution mentioned, attention is directed to an artificial oil then recently introduced into commerce. It is described as being colorless, as having a specific gravity of 1.176 and as boiling at 398° F. (203° C.).

The specific gravity compares favorably with 1.180, the figures required by the Pharmacopœia of 1880 for the natural oil of wintergreen, in place of which the synthetical oil was obviously intended to be used. And the boiling point, while notably lower than that of pure methyl salicylate, fulfilled the necessity of a temperature above 200° C., required at that time, *vide* National Dispensatory, third edition, p. 1060. The cause of this variance in the boiling point may have been the presence of the methyl ether which Mr. Bullock suspected in the sample.

By a number of experiments the writer has been enabled to develop the hydrochloric acid method already described as the one most frequently directed for the preparation of the artificial oil, and to devise the following practical and economical process, which yields an oil of good qualities:

Salicylic acid	505.470 grammes.
Methyl alcohol	690.850 grammes.

APPARATUS FOR THE PRODUCTION OF METHYL SALICYLATE.



The salicylic acid was added in portions to the methyl alcohol contained in a wide-mouthed flask until a saturated solution was obtained. This solution was then heated to the boiling point on a water bath, the flask having been connected with an upright condenser. Dry hydrochloric acid gas was passed into the hot solution until the latter was thoroughly saturated. The flask was then disconnected, an addition of about ten grammes of salicylic acid made, the flask replaced and the solution again completely saturated with the hydrochloric acid gas. Such additions of salicylic acid and subsequent treatment with hydrochloric acid gas were repeated until all of the former substance had been added. After the last addition, the passage of the hydrochloric acid gas was continued for about two hours.

The contents of the flask were then found to have separated into two distinct layers, the lower of which was an oily liquid of a dark brown color. The upper layer was decanted, the lower washed with water until no longer acid to litmus paper, and then distilled from a flask with the aid of live steam.

The oil was separated from the excess of water by means of a separating funnel, and afterwards completely dried by the use of anhydrous calcium chloride.

The salicylic acid used had a melting point of 156° – 157° C.

It was dried at 100° C. The methyl alcohol boiled between 58° and 72° C., and had a specific gravity of .820.

Especial care must be bestowed upon the drying of the hydrochloric acid gas.

The present operator found it necessary to pass the gas over anhydrous calcium chloride and through three bottles of sulphuric acid, as shown in the accompanying illustration.

The quantities directed above yielded 500 grammes of a colorless or slightly yellowish oil, which had an agreeable odor, a specific gravity of 1.187 and a boiling point of 221° C.

All of these qualities harmonize with the official requirements.

The odor of the product has improved on standing.

To ascertain the ultimate composition, the oil was submitted to combustion, whereby the following results were obtained:

	Found.	Calculated for $\text{CH}_3\text{C}_7\text{H}_5\text{O}_3$.
Carbon	63.38	63.16
Hydrogen	5.10	5.26
Oxygen	31.52	31.58

Placing the price of methyl alcohol at \$1.25 per gallon and that of salicylic acid at 56 cents per pound, the cost of the raw materials required to produce 500 grammes of oil by the process proposed would be 99 cents.

The proportionate rate for one pound would be 83 cents, while an allowance of 7 cents, which more than defrays the expense of salt and sulphuric acid (for the preparation of the hydrochloric acid gas) and heat needed to make that amount, raises the cost of the artificial oil to 90 cents per pound.

In connection with the consideration of methyl salicylate, it might be remarked that ethyl salicylate of good quality can also be made by this process. It is reported that the ethyl compound is sometimes substituted for the methyl. The odor of the ethyl salicylate is rather more delicate than that of the methyl salicylate. Specifically, methyl salicylate is decidedly the heavier.

DR. W. G. BOORSMA'S PLUMIERID.¹—

An infusion of the bark of *Plumiera acutifolia* P., an Apocynaea, cures horses of chronic colic. The bark is very bitter; contains an acid, "plumiera acid," discovered by Altheer and Oudemans (Gen. Tijdschr. v. Ned Indië x, 1863, p. 183). This acid is not bitter.

A maximum yield of about 6 per cent. was obtained, in white crystals, of this bitter principle. (Minimum not given.)² The finely-powdered bark is hereto exhausted with alcohol. There is a brownish green, waxy mass left, when the alcohol is distilled off, *which is not bitter* when exhausted with water. The bitter principle has been dissolved in the water. Crystals form in this watery exhaustion, when it is evaporated *in vacuo* to a thin extract and left to itself for some time. The watery solution is treated with lead acetate. The excess of lead is removed with H₂S. The fluid is evaporated to a minimum and decolorized through charcoal. The product of this treatment is intensely bitter. It is washed with boiling amyl alcohol. The amyl alcohol is removed in a separator and at last by warming. The decolorization process is to be repeated until final product is colorless. Leave the watery fluid to itself for crystallization. Collect crystals, dissolve them in warm amyl alcohol and water, under addition of some MgO; filter warm. Leave again

¹ Condensed from "Mededeelingen uit' s. Lands Plantentuin, 1894." The first series of these "Mededeelingen" are from the pen of Dr. M. Greshoff, and appeared in the AM. J. OF PH., Mar. 1891, p. 124. J. B. NAGELVOORT.

² The leaves contain only traces of it.

to crystallize. Dry crystals between filter paper and remove the odor of amyl alcohol by warming.

The bitter taste of the crystals is to be detected in a 1:15,000. solution (Plumierid is, therefore, much less bitter than quinine, which is to be detected in a 1:50,000 dilution. Referent.)

Plumierid does not contain nitrogen. Its solutions are neutral.

Plumierid does not reduce Fehling's fluid, when boiled with dilute acids; it is, therefore, an indifferent bitter principle.

Plumierid crystallizes with 2.5 per cent. water of crystallization. It commences to char at 150° C., but has not melted at 200° C.

Platinic chloride, gold chloride, silver nitrate, lead acetate, lead subacetate, mercuric chloride, potassium mercuric iodide, picric acid, nor tannin solutions produce a precipitate in its watery solution, 1:20.

Sulphuric acid dissolves it with an intense yellow color. A greenish black precipitate is thrown down in 24 hours, while the fluid is violet.

Potassium dichromate, added to its solution in sulphuric acid, gives green stripes. (Great caution is needed where green colors appear after the addition of potassium dichromate, not to draw a wrong conclusion. Referent.)

Nitric acid dissolves it colorless. This solution leaves a yellow red residue when evaporated.

Hydrochloric acid dissolves it colorless in the cold. The solution soon becomes yellow and red; a brown precipitate settles down after 24 hours, while the fluid is violet. The solution is immediately yellow and red when a few mgr. of Plumierid are boiled with 1 c.c. HCl. This solution, too, discolors and throws down a dark brown precipitate. The filtrate has dichroistic properties; is red by transmitted light, blue by reflected light. (Those dichroistic properties from boiling with HCl remind one of Resorcinol reactions. Referent.) A purple-blue colored fluid is obtained by dilution with water. An excess of caustic soda or ammonia changes the color to orange.

Plumierid has the formula $C_{30}H_{40}O_{18} \cdot H_2O$. It is not poisonous.

The genus *Plumiera* seems to be rather remarkable from a phytochemical standpoint. Peckolt obtained a crystalline alkaloid from *P. lancifolia*, which he called agoniadine; *P. drastica* is a very active purgative.

THE PRODUCTION AND USES OF COTTON-SEED OIL.

BY P. L. SIMMONDS, F.L.S.

I think I may claim the merit of having first suggested the production of cotton-seed oil. Forty years ago, in a course of lectures I gave before the Society of Arts and Manufactures in London, on "The Utilization of Waste Products," I mentioned, among other waste products, cotton seed, which was then an incubus cotton cultivators did not know how to get rid of.

The Council of the Society of Arts awarded me their silver medal for my valuable suggestions, and subsequently elected me a life member under one of their rules, in consideration of being eminent in the application of abstract science to the Arts, Manufactures and Commerce.

These lectures I afterwards expanded into a volume, under the title of "Waste Products and Undeveloped Substances," which went through several editions and is now out of print. I have reason to believe that the adoption of many of my suggestions has resulted in fortunes to some, and has utilized profitably much of the former waste in manufactures.

The Science and Art Department employed me to form a collection of waste products and their utilization, with a descriptive catalogue, which is now placed in the Bethnal Green Museum.

I had also to make a similar collection for the Austrian Government at the Universal Exhibition, held in Vienna in 1873.

To return to cotton-seed oil. At the time my suggestion was made of utilizing cotton seed for oil in 1855, the United States production was less than 1,250,000,000 pounds; now the production has risen to about 3,500,000,000 pounds. The first shipment of cotton-seed oil in the year ending June, 1872, was but 547,165 gallons, and few would have anticipated it would reach, in 1892, the enormous export of nearly 14,000,000 gallons, worth nearly \$14,000,000. The various forms of cotton seed all yield good oils capable of being refined for dietetic use.

The oil possesses excellent lubricating qualities, and is useful for soap-making and for lamps. The quantity of oil produced, even in England, is large, the imports of cotton seed exceeding, in some years, 400,000 tons.

In the States the production of seed exceeds 3,000,000 to 4,000,000 tons, of which half is available for oil; 100 pounds of

seed will yield two gallons of oil. There are four qualities of oil made. The crude oil is of a dirty yellow to reddish color; on standing it deposits a slimy sediment. The second quality has a pale orange color, and is obtained by refining the crude oil with a solution of caustic soda. The yellow oil resulting from this process is further purified by being heated and allowed to settle again, or by filtration, and is called "yellow summer oil." "Winter yellow oil" is made from the above material by chilling it, until it partially crystallizes, and separating the stearin (about 25 per cent.) in presses, similar to those used for lard.

This is then treated with fuller's earth in a tank, which holds back the coloring matter, and the oil which issues from the filter press is almost white.

In 1893, there were probably 1,250,000 tons of cotton seed crushed in the United States. From this seed there were obtained 1,000,000 barrels of oil. It is estimated that 300,000 barrels were used in Chicago for making oil lard; and St. Louis, Kansas City and Omaha took 200,000 for the same purpose. About 250,000 barrels went to Holland for making margarine, and large quantities to Southern Europe for mixing with olive oil.

Cotton-seed oil appears to be useful for table purposes, and it is desirable that its use in the pure state, rather than as a mixture, should be encouraged. It ought, however, to be sold on its merits, and with the addition of some qualifying term, which will indicate its origin.

This oil has entirely replaced olive oil in America, and there is scarcely a restaurant in London or Paris in which this new "salad oil" has not taken the place of the old Lucca product. In Portugal every means are now taken to prevent the sophistication of olive oil with cotton-seed oil, or passing it off as a food oil of the same value as olive oil.

For pharmaceutical purposes cotton-seed oil cannot be regarded as a good substitute for olive oil. It saponifies with difficulty as a drying oil, and the coloration which it gives with nitric acid shows that if used for any preparation liable to oxidation it may give curious results. The density of crude cotton-seed oil is 0.920 to 0.933, and when refined 0.925 to 0.930.

To distinguish cotton-seed oil from olive oil, take pure, colorless nitric acid of the density of 1.40 and mix it with half the quantity

of oil in a test tube, closed with gum. After shaking it for several seconds, allow the tube to rest in a vertical position for five or six minutes. If the oil is from olives, the liquid is at first pale or colorless, changing to an ashy gray, with a slight yellowish hue. On shaking, a coffee-brown color will be seen if cotton-seed oil is present. The reaction is delicate enough to detect an adulteration of 5 per cent. of cotton-seed oil.

The shipments of cotton-seed oil from the United States have progressed as follows in decennial periods :

	Gallons.
1873	709,576
1883	415,611
1893	9,462,074

With the extended production of cotton in various countries—India, China, Egypt, Brazil and the United States—a great future awaits cotton-seed oil. Some idea of the magnitude of the future may be formed from the fact that British India produced in 1889 a little over 9,000,000 cwt. of cleaned cotton; that amount must have been obtained from 27,000,000 cwt. of seed. Allowing half this to be required for home consumption and seed for next crop, over 6,000,000 cwt. of seed should have been available for export, whereas the export of seed has hitherto seldom reached 37,000 cwt. This year the export of seed will be larger, as for the nine months already expired, nearly 89,000 cwt. has been shipped. The weight of seed may be estimated at three pounds for every pound of cleaned cotton.

NOTES ON SOME SAPS AND SECRETIONS USED IN PHARMACY.

BY P. L. SIMMONDS, F.L.S.

[Continued from p. 135.]

Garcinia, sp. The yellow gum resin known as gamboge and used as a pigment and in medicine is believed to be obtained from different species of this family. From *G. cochin chinensis*, Chois., *G. Morella*, Desv., *G. pictoria*, Roxb., *G. Hanburii*, Hook. fil. Several Indian species of *Garcinia* seem to furnish gamboge.

It is chiefly received from Siam in the form of pipe or roll, and in cylindrical masses. It has a faint odor, and an acrid, rancid, afterwards sweetish taste. It is employed medicinally in the treatment of dropsical affections, amenorrhœa and obstinate constipation,

attended with torpidity of the bowels, and has frequently been found effectual in the expulsion of the tape-worm. It is a valuable drastic and hydragogue cathartic, and also possesses anthelmintic and diuretic properties. It consists of 75 per cent. of resin and 15 of gum.

On the Continent of Europe it is known as "gum gutte," from the mode of its preparation. When the sap of the tree is in active circulation, the leaves and young branches are broken off, and the yellow juice that flows from the wounds is collected in cocoanut shells, or twisted leaves, of the plant itself. This is afterwards poured into larger vessels, made of clay, and dried in the sun until it is of a proper consistence.

G. bowa, Roxb., yields a kind of gamboge of a somewhat paler color than that produced by *G. Morella*.

Gardenia lucida, Roxb. A fragrant exudation, known in India as "Dikamale resin," is procured from the tops of the branches. It is extensively used in Indian hospitals as a slight dressing for open wounds, to keep away flies from the sores, on account of its strong aroma.

Guaiacum officinale, Lin. A medicinal resin is obtained from the stem of this tree, called *lignum vitæ*. It exudes spontaneously, and is partly obtained by extracting with alcohol. The resin is obtained most copiously by wounding the tree, which is usually done in May. Another method is by heat. The trunk and larger limbs being sawn into billets of about three feet in length, an angular hole is bored lengthwise in each, and one end of the billets so placed on a fire that a calabash may receive the melted resin, which runs through the hole as the wood burns. It is also obtained in small quantities by boiling chips or shavings of wood in water, with common salt. The resin swims on the top and may be skimmed off.

The resin is inside reddish or greenish-brown, brittle, gray-white when pulverized, turns greenish in the air, has a balsamic odor and a sweetish bitter taste, which is at the same time acrid and irritating to the throat. The resin is chiefly used in gout, chronic rheumatism, etc. A decoction of the capsules, wood or bark is also used in medicine as a sudorific. A tincture made of the resin diluted with water is used to cleanse the mouth, strengthen the gums and relieve the toothache.

The British imports are small, seldom exceeding thirty or forty packages in a year. The guaiacum in tears is supposed to be the product of *G. sanctum*, Lin.

Humirium floribundum, Mart. This plant, in Brazil, yields from its trunk, when wounded, a fragrant, limpid, pale-yellow balsam, called Umiri, possessing the same medicinal qualities as Balsam of Copaiva. It is used by the natives for gonorrhœa, chronic cystitis, bronchitis, and all diseases attended with excessive secretion. A decoction of the bark is used as a remedy for coughs and derangement of the stomach. Another species, *H. balsamiferum*, Aubl., yields a similar balsam in Guiana.

Hymenæa Courbasil, Lin. A fine, transparent, fragrant gum-resin exudes from this tree. In solution it has been given internally in doses of a teaspoonful for rheumatic and pseudo-syphilitic complaints, and employed externally as an embrocation. In Brazil the resin is mixed with sugar and rum, so as to make an agreeable emulsion or syrup, which is administered in tedious coughs, weakness of the lungs, spitting of blood and incipient phthisis pulmonalis. A decoction of the inner bark is said to act as a vermifuge.

Icica Tacamahaca, Kth. The fragrant, bitter resin of the above species is used in Brazil for making ointments. Another Tacamahaca from *Elaphrium tomentosa*, Jacqu., fetches in Mexico \$1 a pound. The resin of *Icica heptaphylla*, Aubl., in Venezuela, takes the properties of Thus. When liquid it is a valuable remedy for coughs. A decoction of the bark is an emetic in fevers. The *Calophyllum Calaba*, Lin., yields East Indian Tacamahaca.

Icica icicariba, DeC., produces a great deal of the resin passing under the name of "Almaciga," which is much used in medicine and the arts. It is found in the provinces of Maranhão, Pará and Amazon, in Brazil. Another *Icica*, known as "Pave de brea," also furnishes it in the same provinces. Some of the resin known as Almaciga is said to be furnished by *Bursera balsamifera*, Pers., *Hedwigia balsamifera*, Sw., and is aromatic like incense. Elemi proper is from *I. icicariba*, DeC., and *I. araconchini*, Aubl., but is often replaced by the resin of other species of the same genus. The odorous resin which exudes from the trunk, gives off, in burning, a lively, agreeable odor. This is used as incense in the churches of French Guiana. It is sometimes used medicinally as balsam of Araconchi, but there is little demand for it in commerce. On

wounding the bark of the Jamaica birch (*Bursera gummifera*, Jacq.), a white, resinous sap exudes, which soon hardens and is in no way different from gum Elemi.

Elaphrium Jacquinianum and *E. elemiferum*, natives of Mexico, also produce a fragrant balsamic, glutinous resin, which furnishes one of the sorts of Elemi. Elemi is very friable, and, when heated, puffs up and melts. In boiling water it agglomerates without melting; slightly soluble in ether, insoluble in acetic acid and caustic soda, slightly soluble in carbonic sulphide, soluble in turpentine, slightly soluble in boiling linseed oil, benzine and oil of naphtha. Sulphuric acid dissolves it, coloring it a dark bistre; nitric acid colors it a dirty yellow without dissolving it, and ammonia does not act upon it. What is known as Manila elemi is believed to be a resinous exudation from *Canarium commune*, Lin. In burning, elemi gives out a lively and agreeable odor, hence it is used for incense in some churches.

KINO. Under this common name is known as an astringent and resinous deposit, being the dried sap of several trees of India, Africa and Australia.

The best Kino, which contains about 75 per cent. of tannic acid, exudes from the sap of *Pterocarpus marsupium*, DeC., in India, and dries in angular pea-like grains in the course of a day or two. Another kind which was originally brought from Africa, under the native name of Kano, is the sap of *Pterocarpus erinaceus*, Poir.

Nearly all the Australian Eucalypti exude astringent gum resins in considerable quantity, resembling Kino in appearance and property.

The red juice which flows from fissures in the barks of the Indian creepers, *Butea superba* and *B. frondosa*, Roxb., yields some of the Indian Kinos. Kino is commonly used in medicine as a powerful astringent, especially in diarrhœa, chronic dysentery and other such cases, and as an injection in leucorrhœa, and as an application to ulcers.

The tincture of Kino, although used medicinally, has an inconvenience, which is found to arise from its changing to the gelatinous form.

Kino resin is dearer than it has ever been within living memory, £20 per cwt. being now the nominal quotation.

The British imports are very small, only averaging 15 or 16 packages now, whereas they were 98 in 1884, and 73 in 1888.

Lactuca species. From several species of *Lettuca*—*L. virosa*, *L. scariola*, *L. altissima* and *L. sativa*—the drug known as “Lactucarium” is obtained. It is the hardened, milky juice which exudes from the cut stems in Germany, France and Austria. The average yield from each plant is only from 40 to 50 grains. It occurs in commerce in the form of angular pieces of a brownish color, internally opaque and wax-like. It possesses slightly narcotic properties and is useful in coughs.

Laurus gigantea.—“Caparrapi balsam” is referred to this tree. It is so named from the village of Caparrapi, in the province of Cudinamarca, Colombia, where it is prepared. It may probably be derived from *Oreodaphne epifera*, Nees. The seed is oily and has a burning taste like capsicum. The balsam has an aromatic odor and resembles balsam of Tolu, but is more fluid.

In medicine it is used by the natives as a stimulant in catarrhal complaints, and is also employed by them in the treatment of snake bites and the stings of poisonous insects.

Liquidambar orientale, Miller; *L. imberbe*, Aiton. A balsamic gum-resin, prepared from the bark, is known as liquid Storax, and in the East as “Rose Malloes.” It is stimulant and detergent and similar in action to the balsams of Peru and Tolu.

Another species, *L. styraciflua*, Lin., exudes a sweet gum through cracks in the bark and wounds in the trunk, during all seasons of the year, which hardens on exposure to the air. It is much esteemed by children for chewing and is soluble in water. This gum yields a balsam more terebinthine in odor, but almost as pleasant as Tolu balsam. This syrup is produced in the Southern States of America. It is transparent, amber-yellow, has the consistence of a thick oil, and an aromatic, bitter taste. It has been used in the form of ointment for healing indolent ulcers, and for cutaneous diseases.

A syrup of Liquidambar is used for the diarrhœa of infants. It is largely exported from Bombay to China, where it has for many centuries been used as a medicine. The dried and compressed residual bark, after boiling for the storax, constitutes the fragrant cakes formerly common and well known in Europe, under the name of *Cortex Thymiamatis*.

L. altingia, Blume, also yields the fragrant balsam known as liquid storax. It is vanilla-scented, containing much styrol and styracin, and is often used for imparting scent to some sorts of tobacco and cigars, and also for keeping moths from clothing. Its use in medicine is more limited than in perfumery. The solid exudation known as storax is from the stem of *Styrax officinale*.

Moringa pterygosperma, Gaertn. This small tree yields a gum which is white as it exudes, but gradually turns to a mahogany or claret color as it dries. This is one of the balsa Tragacanth which are used in native medicine.

Musa paradisiaca, Lin. The sap has medicinal properties; it is used in San Domingo to stop internal and external hemorrhage, as tannin is in other countries. At the Philippines it is used to heal a species of venereal disease, very common in the province of Biscayas.

[To be continued.]

THE CHEMISTRY OF IPECACUANHA.¹

BY DR. B. H. PAUL AND A. J. COWNLEY.

In some papers published conjointly by us previously, in the *Pharmaceutical Journal*,² it has been shown that the descriptions generally given of the alkaloid, to which the medicinal action of ipecacuanha is attributed, are for the most part erroneous. It is stated that this constituent of the drug, as hitherto obtained, is chemically an individual substance; but the accounts given of its physical characters are remarkably discordant. We have, on the contrary, shown that ipecacuanha resembles cinchona bark—a product of the same natural order—in containing at least two alkaloids, and probably other alkaloids in smaller proportions.

Of the two alkaloids which we have isolated and examined, one is uncrystallizable, but capable of forming salts which are crystallizable, though for the most part very freely soluble. This base is readily soluble in ether, alcohol or chloroform, very sparingly soluble in water or petroleum spirit, and insoluble in solutions of caustic alkali. We have retained for it the name of emetine.

¹*Phar. Jour. Trans.*, February 16, 1895.

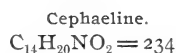
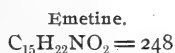
²*Ph. J.*, liii, 61, liv, iii, 373.

The other alkaloid—cephaeline—is crystallizable, less soluble in ether than emetine, but freely soluble in alcohol or chloroform, much more soluble than emetine in hot petroleum spirit, and readily soluble in solutions of caustic alkali.

By these characters the difference between the two alkaloids is very distinctly marked. There are also differences in their melting points—emetine melting at 68° C., cephaeline at 102° C.—and in their percentage composition, as is shown by the following comparison :

	Emetine.	Cephaeline.
Carbon	72.01	71.28
Hydrogen	8.86	8.69
Nitrogen	5.75	6.24
Oxygen	13.38	13.79
	100.	100.

These figures give as their most simple expression the following formulæ :



Analysis of the neutral hydrochloride salts has shown that the quantities corresponding to these formulæ are respectively equivalent to one molecule of hydrochloric acid.

The very marked peculiarity, common to both alkaloids, of forming crystalline salts more readily in the presence of excess of acid than when neutral solutions are slowly evaporated, led at first to the erroneous conclusion that neutral cephaeline salts were uncrystallizable and that the crystallizable salts of both emetine and cephaeline were acid salts. It has since been ascertained that cephaeline hydrochloride can be obtained in well-defined prismatic crystals when a slightly acidified solution is slowly evaporated, and that this salt contains equal molecular proportions of alkaloid and acid.

In the case of emetine the influence of an excess of acid in determining the formation of a crystalline salt is still more marked. On adding a drop of moderately strong hydrochloric acid to a particle of emetine, a mass of acicular crystals is at once formed.

Both emetine and cephaeline are very sensitive to the influence of light. Though perfectly colorless when pure and in a free state, they rapidly acquire a yellow color when exposed to sunlight.

Solutions of the alkaloids in alcohol, chloroform, benzene or ether, also become colored on exposure to light, with formation of a reddish-colored deposit. The salts of both alkaloids, on the contrary, do not appear to undergo similar alteration, but in a pure state remain perfectly colorless when exposed to light.

Since the publication of the last paper on ipecacuanha a third alkaloid—the probable existence of which has already been indicated—has been isolated in small quantity. It exists in the drug in very small amount relatively to emetine and cephaeline, and it differs from those alkaloids in being very sparingly soluble in ether. This alkaloid is soluble in alkaline liquids, and it remains in the ammoniacal liquor from which emetine and cephaeline have been extracted by shaking with ether. It was extracted from that liquor by shaking with chloroform. The quantity obtained as yet was too small to admit of complete examination, but the physical characters of this alkaloid distinguish it in a very definite manner. It is a crystallizable substance obtainable by slow evaporation of an ether solution in well-defined transparent prisms of a pale lemon-yellow color. It melts at about 138° C., neutralizes acids, and apparently has a much higher molecular weight than emetine or cephaeline. It dissolves readily in alcohol or chloroform, the solutions becoming dark-colored on exposure to light and depositing a dark brown substance.

The failure of most previous observers to arrive at correct conclusions in regard to the alkaloids of ipecacuanha presents some collateral features of interest, inasmuch as it shows how largely the results of such investigation may be determined by accidental circumstances. The extraction of ipecacuanha with chloroform in the presence of caustic potash, adopted by Lefort, naturally furnished a product consisting of a mixture of all the alkaloids, and in the absence of any ascertained distinction between them their separation was impossible. Hence the formula assigned to emetine by that observer, on the basis of Dumas' analysis, was inaccurate. In the subsequent investigation by Lefort and Wurtz the result arrived at was defective for the same reasons, although the mixed alkaloids were then obtained in a condition of greater freedom from impurity by extracting the drug with ether in presence of lime.

The result obtained by Podwyssotzki, by using ferric chloride to get rid of the tanni constituent, was vitiated by the use of petro-

leum spirit for extracting the drug. While the product thus obtained was an indefinite mixture of cephaeline and emetine as a consequence of the action of that solvent on both the alkaloids, probably the greater part of the emetine was not extracted at all by the petroleum spirit. In the investigation by Kunz petroleum spirit was also used for extraction with a similar result, as shown by the fact that the alkaloid obtained is described as (partially?) soluble in caustic alkalies. The formula deduced from analysis by Kunz was, therefore, necessarily incorrect, as the material operated upon by him must have been of a mixed nature. The experiments made by Kunz for the purpose of ascertaining the constitution of emetine were also for the same reason fallacious, and, therefore, no importance can be assigned to the conclusions arrived at by him in 1887, or to those which he has more recently put forward on the same basis.

The investigation of the alkaloid of *ipecacuanha* by Glénard was, however, more fortunate in its result. That circumstance was due to the care taken in obtaining the alkaloid in the state of a crystallized neutral hydrochloride, after extracting it from the drug by treatment with lime and ether. As a natural consequence of this mode of operating, the cephaeline was eliminated, and emetine was isolated in a pure condition, as shown by the results of Glénard's analyses, which correspond very closely with our own. Indications of the existence of another alkaloid were observed by Glénard, but they were not followed up by him.

Glénard's observations appear to have received little notice, however, and in most chemical works the formula assigned to emetine by Kunz has been adopted as the most satisfactory. That view must now be abandoned, since the data already published in our previous papers prove that the substance to which it relates could not have possessed chemical individuality.

It is satisfactory in connection with this point to be able to refer to results obtained by Messrs. E. Merck, of Darmstadt, in following up our observations on the alkaloids of *ipecacuanha*. In the *Bericht*, for 1894, recently published by that firm, it is stated that on repetition of our work in their manufactory, our descriptions have been fully confirmed, while the statements of Dr. Kunz-Krause could not be adopted. Following the indications given in the papers already published by us, Messrs. E. Merck now manufacture emetine and

cephaeline and their salts, and announce that they are prepared to supply these substances for medicinal use. We understand that they are already receiving orders from England.

The reputed value of ipecacuanha in the treatment of acute dysentery gives a great importance to this drug, but its emetic action has been found an inconvenient objection. Acting upon the assumption that the emetic action is due to the alkaloid, it has been proposed to make use of the drug from which that constituent has been removed. The successful results obtained by some medical men in India with de-emetinized ipecacuanha suggest the possibility that the value of the drug as a remedy for dysentery may be due to some other treatment than the alkaloid.

Some attempt was therefore made to isolate and study another constituent of ipecacuanha which has been described by Willigk, under the name of ipecacuanhic acid, as analogous to tannic acid and having a composition represented by the formula $C_{14}H_{18}O_7$. Following on the lines of Willigk's process, an alcoholic extract of ipecacuanha was mixed with basic lead acetate until no further precipitate was formed. The lead precipitate, collected and thoroughly washed with strong alcohol, was treated with weak sulphuric acid not quite sufficient to convert the whole of the lead into sulphate, and the clear alcoholic liquid was evaporated to dryness. In that way a reddish-brown amorphous material was obtained, amounting to about 2.25 per cent. of the drug, and corresponding to Willigk's description—very soluble in water, or alcohol, of bitter taste, and giving a green coloration with ferric salts, but not precipitated by gelatin. It was found to have no emetic action in doses of 4 or 5 grains. After boiling with acid it reduces Fehling's solution. The product so obtained was, however, a crude material, and probably of a mixed character. By treatment with absolute alcohol it was almost entirely dissolved, leaving about 5 per cent. of residue. The solution, mixed with dry ether, gave a white precipitate amounting approximately to 20 per cent., which darkened on exposure, and presented some resemblance to saponin, and, after boiling with acid, it reduced Fehling's solution. On evaporating the ether alcohol solution a residue was obtained amounting to about 60 per cent., which was soluble in water, and gave a dark green color with ferric chloride. The water solution did not froth on shaking, but after boiling with acid it reduced Fehling's solution.

These characters point to the probability that Willigk's ipecacuanhic acid was not a definite substance, but a mixture, and further examination will be requisite for ascertaining its true chemical nature. That appears to be of importance as regards the medicinal action of ipecacuanha, since it is stated on good authority that the utility of the drug in the treatment of dysentery is augmented by the removal of the alkaloids.

The two alkaloids, emetine and cephaeline, are contained in the ipecacuanha of New Grenada, as well as in that of Brazil, the only difference in this respect being the larger relative proportion of cephaeline in the New Grenada drug. So far, therefore, as the medicinal effects of the drug are due to these alkaloids jointly, there would appear to be but little difference between Brazilian ipecacuanha and that of New Grenada, so that the latter might, without disadvantage, be made official in the Pharmacopœia.

Assuming that the medicinal properties of ipecacuanha are due to the alkaloids emetine and cephaeline, it may be inferred from the characters of these substances that in making galenical preparations of the drug, a process which would insure their conversion into salts would be preferable to one furnishing a product in which the alkaloids were in a free state and liable to alteration under the influence of light. In that respect the acetic acid extract used in the preparation of the official B. P. wine would seem to be well adapted for the purpose, since solutions of the salts do not appear to undergo alteration when heated, unless it be that the acetic extract is too mixed a product, containing some constituent which helps to destroy or remove the alkaloids. Mr. John C. Umney's observations on the loss of alkaloid in ipecacuanha wine to the extent of one-fifth seems to point in that direction. But now that the alkaloids or their salts are obtainable in a pure state, a very excellent ipecacuanha wine, suitable for administration as an expectorant, can be made by dissolving half a grain of emetine hydrochloride in four ounces of sherry.

SWEET CASSAVA.—

BY HARVEY W. WILEY.

(Abstracted from Bulletin No. 44, U. S. Department of Agriculture, Division of Chemistry.)

In the southern peninsula of Florida, and growing well up into the frost belt, is found in many localities a cultivated plant known as cassava, or sweet cassava. From a careful study of the climatic conditions under which the plant flourishes, it is safe to assume that it may also be grown with success in southern Alabama, Mississippi, Louisiana and Texas. Cassava is a name which should properly apply only to the purified starch derived from the roots of the plant, but it has passed into general use to designate the plant itself. Botanically, the plant is known as *Janipha manihot*, *Manihot utilissima*, *Jatropha manihot*, *Manihot aipi*, *Manihot laeflingii*, and *Manihot palmata*. One of its common names is manioc plant.

There is properly only one variety of the plant growing in Florida, while that variety which grows in the tropics contains so (much hydrocyanic acid as to render it poisonous.) The variety grown in the subtropical region of Florida, however, contains only a small quantity of hydrocyanic acid, and is, therefore, commonly known as sweet cassava. It is quite probable that after the tropical variety has grown for some time in a subtropical climate, it would lose largely its poisonous properties.

The attention of the Division of Chemistry was first called to the cassava plant as an article of food and a possible source of starch, in 1888, in a letter received from Mr. R. H. Burr, of Bartow, Fla., who also sent a package of the roots. These roots were long, slender and of various sizes, some of them two feet long and weighing several pounds. The analysis of the substance, exclusive of the bark, calculated to dry substance, is given in the following table:

	Per Cent.
Ash	1.94
Oil (petroleum ether extract)	1.27
Ether extract (resins, etc.)	0.74
Alcohol extract (amides, sugars, glucosides, etc.)	17.43
Crude fibre	4.03
Starch	71.85
Albuminoids (calculated from nitrogen)	3.47
	<hr/> 100.73

The amount of starch compares fairly well with the best varieties of potatoes. On account of the large quantities of sugars present, the cassava root could be more economically used for the manufacture of glucose than for starch.

A larger quantity of the root was obtained from Florida, the bark separated from the root, and each subjected to analysis, with the following results :

	Peeled Root.		Fibre after removal of Starch.	Bark of Root.	
	Fresh.	Dry.	Dry.	Fresh.	Dry.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	61.30	—	—	61.30	—
Ether extract . . . . .	.17	.44	.30	.66	1.70
Albuminoids (N \times 6.35) .	.64	1.66	1.02	2.29	5.91
Starch	30.98	80.06	64.64	—	—
Fibre . . . . .	.88	2.26	10.68	3.83	9.89
Ash . . . . .	.51	1.31	1.42	2.02	5.23
Undetermined	5.52	14.27	21.94	29.90	77.27
	100.00	100.00	100.00	100.00	100.00

With the starch in the analysis given above is reckoned also the soluble carbohydrates, consisting almost exclusively of cane sugar, and of which, in an analysis of another portion of the dry substance, as high as 17 per cent. was found. In the laboratory it is not difficult to prepare crystallized cane sugar from the aqueous extract of the fresh pulp. The percentage of sugar in the plant, however, is too low to excite any reasonable hope of the preparation of this article on a commercial scale. The most promising way to save it is by conversion into glucose, as indicated in another place. The undetermined portion consists of the digestible fibre and carbohydrates of the pentose series. The pentosans in the fibre were determined by the furfural process, as modified by Krug, and the amount in the air-dried material was found to be 3.92 per cent., and in the material after the removal of the starch, 5.33 per cent.

The amount of mineral matter taken from the soil by the 100 kilos of the fresh root is approximately only one-half a kilo. The

albuminous matters are also present in small quantities, being only slightly more in amount than the ash itself. The plant, therefore, is one which seems particularly suited to feed almost exclusively from the air and water, and hence is one which could be recommended on the sandy soils of Florida as a crop which would require the minimum of fertilization.

The ash was found to consist of silica, ferric oxide, calcium oxide, magnesium oxide, sodium oxide, potassium oxide, phosphoric acid, sulphuric acid, carbonic acid, and chlorine. The calcium, potassium and phosphoric acid made up three-fourths of the ash in the peeled root, while silica and potassium predominated in the bark from the root.

Quite a number of preparations are made from the starch of the root, and among them may be mentioned: (1) Tapioca; the first portions of starch washed out, especially, produce an excellent article of tapioca when treated in the usual way. (2) Glucose; both the fresh root and the extracted root yield full theoretical amounts of glucose, and samples of this article were made by the conversion of the starch both by sulphuric acid and by diastase. The samples of glucose made from the starch were exceptionally good, especially when diastase was used, the glucose in this case containing large quantities of maltase. (3) Alcohol; the glucose on fermentation affords the usual quantity of alcohol. (4) Cane sugar; a beautiful preparation of cane sugar was made from the water used in washing out the starch. The amount of cane sugar, however, is not large enough to warrant its extraction on a commercial scale from the waters used in washing. It is, however, present in such quantity as to indicate that in making glucose it is better to use the whole root, and so obtain the product from both the cane sugar and the starch, rather than to make it from the starch alone.

The general result of the investigation is to establish the fact that the cassava is a plant of high economic value, and worthy of the attention of those interested in the carbohydrate products of the country.

Cassava has been grown for one year on the department experiment station at Runnymede (post-office, Narcoossee), Osceola County, Florida. The field in which the crop was grown is high pine sand, with almost no other ingredient.

Attempts were also made to grow cassava in a piece of very wet

muck land on the station, in which sugar cane would not grow to any advantage. An immense development of tips was secured, some of the plants reaching a height of 10 feet, and resembling young trees. The root development was fair, but not commensurately increased with the top growth.

The profits which the farmer may make from growing this crop, and the manufacturer from using it, should be based upon a yield of 4 or 5 tons per acre. If it be desired to make starch from the plant, we may suppose, as a minimum rate of yield, that 20 per cent. of the weight of the fresh root may be obtained as a merchantable starch of a high grade. On a yield of 4 tons per acre, this would amount to 1,600 pounds. Compare this with the weight of starch obtained from Indian corn producing 40 bushels per acre. The yield of merchantable starch of a high grade may be placed 35 pounds per bushel, which for 40 bushels would amount to 1,400 pounds. It is thus seen that the yield per acre in the matter of starch from cassava would be fully equal, if not superior, to that from Indian corn. If the manufacture of glucose be considered, the estimate is even more favorable.

CONCLUSIONS.

(1) Cassava can be cultivated with safety and profit in the greater part of the peninsula of Florida, and probably also in southern Alabama, Mississippi, Louisiana and Texas.

(2) It will yield, with fair treatment, on sand soils, from 4 to 5 tons per acre.

(3) It will give, when properly manufactured, from 20 to 25 per cent. of the weight of the fresh root in starch of high grade.

(4) The starch is naturally in a pure state, and no chemicals of any kind are necessary in its manufacture.

(5) The starch resembles, in its physical properties, that of maize, and can be used as a substitute therefor in all cases.

(6) An excellent article of tapioca can be prepared from the starch of the cassava plant.

(7) Glucose can be prepared directly from the starch, or more profitably from the pulp of the peeled root.

(8) The plant furnishes an excellent human and cattle food, deficient, however, in nitrogen. It would make a well-balanced ration for cattle when mixed with one-fourth its weight of cotton-seed oil-cake.

CHEMISTRY FOR THE PHARMACIST.

BY WILLIAM B. THOMPSON.

There are many reasons why pharmacists who seek avenues for the application of scientific knowledge should make especial study of the chemistry of agriculture and the chemistry of soils. Soil analysis is wholly within the possibility of scientific investigation. In the growth of plants and trees, soil loses nothing appreciable of its ponderous material. The elementary substances which enter into it are exhausted by absorption and the processes of vegetable growth. Nature has, it is true, her own occult method of supplying these, but art is a most valuable factor in supplementing or aiding the operations of natural causes. Science has done much, and there is yet much to be done, and agriculture much needs the principles and theories of science applied to its practice. Themes for study are to be sought in determining the action of manures and other animal and mineral fertilizers—the terms or periods necessary for the proper recuperation in cleared and open lands, where the chemical elements are only to be derived from the air, artificial treatment not being feasible; the character of sub-soil as it affects top soil; the action of infiltration and absorption; the upward and downward movements of moisture. In cattle manures the important office of the saturating urines, which, by a species of fermentation, gradually develop the ammonias, these, in turn, combining with acids, and thus oxidation forms less volatile and more soluble salts.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION AT THE FORTY-SECOND ANNUAL MEETING, HELD AT ASHEVILLE, N. C., SEPTEMBER, 1894.

By far the most valuable part of the proceedings of the last meeting is the Report on the Progress of Pharmacy. It constitutes a sort of pharmaceutical encyclopædia for the year from June 30, 1893, to July 1, 1894. The only regret we have in regard to it as a whole, is that it is not usually available to members until some months after it is presented at the meeting. We are not disposed to find fault with the Secretary on this account, as he has no doubt been delayed by others. In selecting a printer, the Secretary or Council should take time into account as well as the lowest bid. While the original communications are not on a par with the above-mentioned report, still there are a few very creditable ones. The great majority, however, had better remained in the hands of the Publishing Committee.

It is to be regretted that one member should load the Proceedings with six communications on queries, some of which could be answered to the satisfaction of every intelligent pharmacist by a simple negative or affirmative.

The Association was also treated to a rather excessive dose of cod-liver oil. The Publishing Committee will make no mistake to let it be known that only papers of merit will be printed.

COD-LIVER OIL AND CHEMISTRY. By F. Peckel Möller, Ph.D., London, and Christiania, Norway, Peter Möller; and can be had from W. H. Schieffelin & Co., New York, and from A. T. Möller & Co., Copenhagen. 1895.

The author apparently does not try to conceal the fact that this large work of something over 600 pages is intended to be indirectly an advertisement. With this knowledge we are still favorably impressed with the book. It gives, in the 100 pages devoted to cod-liver oil, some facts that it will be difficult to controvert; at the same time it is refreshing to read some of the theories advanced in favor of the administration of a pure cod-liver oil. The author relegates nearly all of the "active principles" which have been discovered at one time or another to the category of decomposition products, and we believe he is about right.

PROCEEDINGS OF THE FIFTEENTH ANNUAL MEETING OF THE NORTH CAROLINA PHARMACEUTICAL ASSOCIATION, ASHEVILLE, 1894.

The proceedings of this Association make a creditable showing with four original papers and some other interesting matter, including the Report of the North Carolina Pharmacy Board.

PROCEEDINGS OF THE MICHIGAN STATE PHARMACEUTICAL ASSOCIATION, AT ITS TWELFTH ANNUAL MEETING, HELD AT DETROIT, 1894.

Five original communications have been allowed to appear in the appendix. They are, however, well worth reading, and it is a pity they were given such an inconspicuous position. We have some doubts about the advisability of printing portraits of living members in proceedings of this kind; particularly when, as in this case, one of the former presidents is made to face an advertisement of Duffy's Malt Whisky, another to face Ayers' Remedies, and so on through the list to the end, where we read of "the greatest medical discovery of the age." Are the Michigan pharmacists trying to deplete the coffers of the proprietary manufacturers, that they admit their "display" advertisements?

FORSCHUNGS-BERICHTE ÜBER LEBENSMITTEL UND IHRE BEZIEHUNGEN ZUR HYGIENE, ÜBER FORENSE CHEMIE UND PHARMAKOLOGIE. Heft 4, 1895.

The most noteworthy and timely article in this issue is concerning "The Action of Formalin on Foods."

ANNUAL REPORT FOR THE YEAR 1894. By E. Merck, Darmstadt.

This report is divided into Original Communications, of which there are six; Preparations, of which a great number of new ones are mentioned; and Drugs.

SKETCHES OF WONDERLAND. By Olin D. Wheeler.

Although the pamphlet is published in the interest of the Northern Pacific Railroad, the illustrations alone are worth the trouble and expense of sending six cents in stamps (to cover postage) to Chas. S. Fee, General Passenger and Ticket Agent N. P. R. R., St. Paul, Minn. It may at the same time be useful to some members of the A. Ph. A. who are going to Denver.

ABSTRACT FROM MINUTES OF MEETING OF MEMBERS OF THE COLLEGE.

MARCH 25, 1895.

The annual meeting of members was held to-day, the unusual number of 38 being present. Charles Bullock presided. Reports of permanent committees and of officers of the College were received at this meeting. Report of editor was made as follows :

During the year there have been published 79 original papers by 40 authors. This number of original contributions has been exceeded but few times in the history of the JOURNAL. Of the authors, 11 were active members of the College, and one, Mr. Hooper, an honorary member residing in India, who contributed two papers. Eleven of the twelve numbers issued were illustrated. The contributions by Professor E. S. Bastin merit special mention, he having furnished 9 papers during the year, all of which were illustrated but one.

Sixty-five reviews and a number of editorials made up the balance of the literary matter.

Although the number of pages in several issues were increased, it was not found possible to publish as many abstracts as desirable.

There was a creditable disposition shown on the part of writers throughout the country to furnish original matter to the JOURNAL, and had it not been for this fact, there would have been a marked decrease in the number of original papers, for the number of contributors among the College membership showed a decided falling off.

It is to be hoped that those who are associated with the College will not forget that much of the advancement of the institution in its early history was due to the scientific character of its members, who were willing to put on record their observations for the benefit of their pharmaceutical brethren.

The Pharmaceutical Meetings are a source of support to the JOURNAL, and it is to be regretted that they have been so poorly attended by members of the College. It has been shown during the present series that valuable papers can be provided for each meeting, but the authors are discouraged by the poor attendance, and consequently the absence of discussion, which materially adds to the value of the contributions.

Mr. Robert England moved that the price of the AMERICAN JOURNAL OF PHARMACY be reduced to subscribers to \$2.50 per annum. Motion amended by Mr. Beringer that the subject be referred to the Committee on Publication. Amendment carried. The treasurer of Publication Committee appended supplementary statements to the general report of the editor as usual. The librarian and curator also made their annual statements, the latter asking for an appropriation of \$133 to perfect some improvements in the museum appliances. Referred to Board of Trustees with approval. Prof. Remington presented communication having reference to a representation by this College at the sessions of the American Pharmaceutical Association, to be held in Denver, to consider the subject of "a uniform college requirement for graduation." The chairman appointed Prof. Remington to represent this College.

The president appointed Messrs. McIntyre, Cliffe and Prof. Trimble as delegates to the Pennsylvania Pharmaceutical Association, which convenes at Eagle's Mere, Pennsylvania, in June. Mr. Boring called the attention of the

members to what he considered an omission in the financial statement distributed to members, namely, that the gross receipts or income of the College was not given. This subject, with some other allied matters, elicited much discussion, being participated in by Messrs. Boring, Robert England, Buckman, Procter, Remington and Beringer. As a result a motion prevailed to refer the subject to the Board of Trustees for full consideration.

Wallace Procter offered the following resolution:

Resolved, That the Philadelphia College of Pharmacy, desiring to record their appreciation of the interest that has always been evinced by the Alumni Association in all pertaining to the advancement of the College, and especially in view of the handsome contribution of over \$1,400 toward the electric light plant just installed, do tender an especial vote of thanks to the Alumni Association of the Philadelphia College of Pharmacy.

A violation of the code of ethics on the part of a member of the College was referred to and facts stated. A committee was appointed to consider the facts and report thereon. The annual election recurring with this date, the following officers and trustees were elected: Charles Bullock, President; Robert Shoemaker, 1st Vice-President; Wm. J. Jenks, 2d Vice-President; James T. Shinn, Treasurer; Dr. A. W. Miller, Corresponding Secretary; Wm. B. Thompson, Recording Secretary; Thos. S. Wiegand, Librarian; Jos. W. England, Curator; Henry Trimble, Editor. Committee on Publication: Henry N. Rittenhouse, Joseph W. England, Saml. P. Sadtler, Wallace Procter, and the Editor. Trustees for three years: Jos. L. Lemberger, Robert England and Saml. P. Sadtler.

Meeting on motion adjourned.

WILLIAM B. THOMPSON, *Secretary*.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, April 16, 1895.

The meeting was called to order by asking Prof. F. G. Ryan to take the chair.

The following books were stated to have been received and placed in the Library: Report on Education in Alaska, and a Monograph on the Domestication of the Reindeer.

Prof. Trimble showed a specimen of Golden Wattle Bark, *Acacia pycnantha*, containing 35 per cent. of tannin, another specimen of the same species assaying from 40 to 42 per cent. of tannin, and said to be the best bark; also a specimen of Sydney Wattle Bark, *Acacia decurrens*, containing 35 per cent. of tannin. The barks had been presented by Mr. J. H. Maiden, of Sydney, New South Wales.

The same gentleman also showed a variety of kino derived from *Eucalyptus calophylla*, R. Brown.

The specimen had been collected in West Australia, and donated by Baron F. von Mueller.

The Actuary was instructed to send the thanks of the College both to Mr. Maiden and Baron F. von Mueller.

Mr. F. W. Haussmann read a paper on Fluid Extracts, which elicited considerable discussion. Glucose had been found in some of the fluid extracts

examined. Its addition, with a view of giving them consistence and of adulterating them, was commented on.

Prof. Ryan pointed to the fact that the small amounts found would not afford enough profit to cause the use of glucose by manufacturers.

Some of the pharmacists present suggested the drug itself to have been the source of the glucose found.

Prof. Trimble was of the opinion that in some cases it might have been introduced through the use of glycerin containing it.

Query was made whether or not the fluid extracts produced by the large manufacturers are official as regards the exact process of preparation given by the Pharmacopœia.

Prof. Ryan stated that the manufacturers often find the pharmacopœial directions poorly adapted to the preparation of these products on a large scale but that, having selected a menstruum and formulated a method through experience, they can produce fluid extracts of uniform and full official strength.

It was remarked that these manufacturers would be glad to advise with the committees charged with the construction of the formulas of the Pharmacopœia.

Mr. L. F. Kebler spoke of some experiments on opium assaying. Some samples of opium which were quite curious were exhibited. One of the samples had a strong odor of coffee and assayed 15 per cent. of morphine. Mr. Kebler also presented a paper on Black Sulphur, a topic that had been discussed at the last meeting, and upon which he had been asked to report.

On motion, the papers were referred to the Publishing Committee and an adjournment ordered.

T. S. WIEGAND, *Registrar.*

A GENERAL INVITATION TO THE MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Members interested in commercial and allied subjects are respectfully invited to write papers for our next meeting, to be held on August 14th, at Denver, Colorado.

As income and revenue derived from the practice of pharmacy is, beyond dispute, the most important factor involved in the pursuit of our material affairs, I hope that hundreds who will be unable to attend the above convention, will favor the commercial section with their views on an impending crisis.

I particularly request the Chairmen of Committees on Trade Interests in every organized State Association to favor me with their existing grievances and problems, to be solved in the interests of the common welfare of our brethren. Many able members whom I approached at Asheville, and suggested that they enlist themselves among writers on commercial subjects, surprisingly responded: What shall I write on? In order to promote the desideratum I take great pleasure in suggesting the following queries:

- (1) Where is the practice of pharmacy drifting?
- (2) To what cause is failure due, in attempting to protect our mutual trade interests?
- (3) Why do a large number of wholesale druggists supply department stores

with drugs and medicine, and violate contract agreements on rebate goods with manufacturers of proprietary medicines?

(4) Under what circumstances is substitution admissible?

(5) Is the protection of the trade interest of the druggists and chemists by the manufacturer of proprietary goods a possibility?

(6) Is general substitution justifiable?

(7) Is it justifiable to purchase unreliable materials for the purpose of increasing profits, thereby injuring the reputation of the physician, and endangering the patient's chance of recovery?

(8) Are non-secret preparations, in imitation of well-known domestic medicines, a legitimate product, and is it honest for a dealer to allow his name to be printed on the label so as to give an unknown compound currency, when he is ignorant of the contents of such preparation?

(9) Does not the pharmacist jeopardize his reputation and standing by dealing in non-secrets, when he possesses the knowledge of compounding as good or better formula?

(10) Does it pay pharmacists to substitute?

(11) Is the claim true, that physicians dispense their own medicines on the ground that pharmacists use inferior materials in their prescriptions?

(12) Where reputable pharmacists discover goods falsely labelled and below pharmacopoeial standards, is it not their duty to expose such dishonesty?

(13) Has excessive competition introduced a "cheap era" into the drug trade?

(14) Why are physicians' supply establishments making inroads on the business of the pharmacist?

(15) What are the chief arguments employed to induce physicians to supply ready-made medicines to their patients?

(16) Where is the practice of medicine drifting?

(17) If the future facilitates the art of dispensing by physicians, what is our remedy?

(18) Is it not our duty to demand protection from the physician and make an effort to fuse our natural relationship by a just compromise?

(19) What argument have we against those who advocate that the day has arrived when any person, with open store for the sale of merchandise, will have the right to sell his goods to any other person who comes with money in hand and demands same, irrespective of his calling or profession?

There is no hypothetical sensationalism in my queries, and I might add a few more sure to present themselves in the future, but we will await developments. There are questions that confront us daily—a revolution in our ranks is imminent. What shall we do about it? Shall we submit to the situation like slaves? Never! Let us get together at Denver and act, not like flustered and unsympathetic brethren, but like men willing to battle for justice and our rights. It is high time to cry halt.

Address all papers and communications to

Very truly yours,

GEORGE J. SEABURY,
Chairman of Commercial Section, A.Ph.A.

EXAMINATION QUESTIONS OF THE PHILADELPHIA COLLEGE OF PHARMACY.

Junior Examination.—The examinations of the Junior students during the past term were on the following subjects :

FIRST JUNIOR EXAMINATION.

PHARMACY.

A—(1) Write a short composition on the Metric System, giving as complete an account as you are able to, upon half a page of the examination paper. (2) Give the equivalents of the following metric quantities in ordinary or old form weights and measures: 5 Kg.; 1774.4 c.c.; 29.573 c.c.; $\frac{1}{2}$ grain; $\frac{1}{100}$ grain. (3) How many grains are there in a fluid ounce of water at 15.6 C. (60° F.); in an imperial fluid ounce of water; in an avoirdupois ounce; in a troy ounce?

B—Define vaporization, evaporation, and distillation, and state the principle which governs the rapidity of the evaporation of liquids at or above the boiling point and below the boiling point.

CHEMISTRY.

C—(1) Define the term specific gravity—as applied to solids and liquids. (2) Give two methods for the determination of the specific gravity of a solid. Two methods for the specific gravity of a liquid.

D—(1) What is meant by “latent heat of fusion?” Give an example of practical utilization of this principle. (2) What effect has pressure upon the boiling point of a liquid? Give an example of a practical utilization of boiling under reduced pressure.

BOTANY

E—*Roots.* (1) Define an adventitious root. (2) Name a common plant that bears adventitious roots. (3) In what group of plants are the roots destitute of a radial structure? (4) In what group of plants do we usually find stems, leaves and hairs, but no roots? (5) What are the chief uses of roots?

F—*Stems.* (6) What names are applied respectively to such a stem as the potato, to the flowering stem of the dandelion, and to the scaly unbranching stem of the palm? (7) In what groups of plants do we find a cambium zone in the stem? (8) What organs of vegetation are necessarily present in a bulb? (9) What is a supernumerary bud? (10) Define a scandent stem.

SECOND JUNIOR EXAMINATION.

PHARMACY.

A—(1) In what respects does colation differ from filtration? Describe the methods and materials employed by pharmacists in both processes. (2) How are mixtures of oil and water separated? Draw a sketch illustrating the apparatus used in the separation.

B—*Crystallization.* (1) What is the object of requiring *perfect resi* for solutions designed for crystallization, and why are such solutions sometimes agitated during the cooling process? (2) Of what use are nuclei in effecting crystallization? (3) What is water of crystallization? (4) Define efflorescence and deliquescence.

CHEMISTRY.

C—(1) State the difference between a binary and a ternary molecule, and give examples of each. (2) What is a haloid acid? An oxygen acid? Give examples of each. (3) Write in symbols the formulas of the following: Potassium bromide, magnesium oxide, mercurous chloride, mercuric chloride, carbon disulphide, phosphorous trichloride, hypochlorous oxide, sulphuric acid.

D—(1) Write two reactions for the preparation of hydrogen. (2) Upon what does the reducing action of hydrogen depend? (3) Mention illustrations of the affinity of chlorine for hydrogen.

BOTANY.

E—*The Stem.* (1) Draw a diagram of a cross-section of a dicotyl stem, and that of a cross section of a monocotyl stem. (2) Name the different kinds of buds a stem may bear. (3) Name the different kinds of underground stems that plants may produce. (4) State the distinction between a stem and a thallus. (5) In what two principal ways may stems branch?

F—*Leaves.* (6) Draw a diagram of circinate pefoliation. (7) How many orthostachies on a stem when the phyllotaxy is $\frac{3}{8}$? (8) The first two members of a series in alternate phyllotaxy being $\frac{1}{2}$ and $\frac{1}{3}$, what would the seventh member be? (9) A certain leaf is described as follows: Petiolate, exstipulate, general outline of lamina ovate, apex mucronate, margin serrate, venation pinni-furcate. Draw such a leaf. (10) What is the chief use of an ordinary or foliage leaf?

FINAL, JUNIOR EXAMINATION.

PHARMACY.

A—*Extracts.* (1) Define extracts. (2) Name six classes of extracts. (3) What are "Succi Spissati?" (4) Give a general process for their preparation. (5) Describe Prof. Herrera's method of making extracts, and state the theory upon which it depends. (6) What proximate principles are usually found in extracts? (7) What class of principles are best extracted by strong alcohol? (8) What class of principles are best extracted by water? (9) Is diluted alcohol a good solvent for extracts? *Give reasons* for your answer. (10) What influence has the choice of the menstruum on the yield of most extracts?

B—(1) What are scaled salts? How are they prepared? (2) Are they usually definite chemical salts, or are they of varying molecular composition? (3) Does reduced iron belong to this class? (4) What is the present official name of reduced iron? What was its former official name? Under what other name is it known in commerce? (5) Describe the method of making reduced iron, illustrating the process by a drawing. (6) What precautions are necessary to prevent the very freshly-made powder from spontaneously igniting? (7) When a dose of reduced iron is administered and eructations of hydrogen sulphide ensue, what is the usual cause of the unpleasant experience? (8) How may the evolution of hydrogen sulphide be prevented? (9) How may the quality of reduced iron be tested? (10) What is its dose?

CHEMISTRY.

C—(1) Give the formula for ammonia. State its sources and methods for its production. (2) Describe the physical and chemical properties of ammonia, and state what are its most important uses at present. (3) How does

ammonia react with hydrochloric, nitric and sulphuric acids? Give the formulas and chemical names of the products in these three cases.

D—(1) Complete the reactions: $\text{Na}_2\text{S}_2\text{O}_3 + 2\text{HCl} =$; $\text{Ca}_3(\text{PO}_4)_2 + 2\text{H}_2\text{SO}_4 =$; $\text{Ca}_3(\text{PO}_4)_2 + 3\text{H}_2\text{SO}_4 =$.

(2) Give the chemical formulas for boric acid, official sodium borate, orthophosphoric acid, official sodium phosphate.

BOTANY AND MATERIA MEDICA.

E—*Organs of Vegetation.* (1) Name in the order of their evolution the organs of vegetation of the higher plants. (2) How would you distinguish between a tuber and a tuberous root? (3) State the distinction between a cladophyll and a phyllode. (4) Make a drawing of a single leaf that answers the following description: exstipulate, petiolate, lamina 2 inches long, obcordate, crenulate, and with a pinnatifid venation. (5) Write the pharmacal name of the drug derived from *Barosma betulina*, and state three of the most important of the structural characteristics of the drug.

F—*Organs of reproduction.* (6) What organs of the complete flower are essential to the production of seed? State the respective functions of these organs. (7) Draw the ground plan of a typical flower of a monocotyl in which the anthers are bilocular and extrorse and the single compound ovary has marginal placentæ. (8) State the most distinctive difference between the flower of an angiosperm and that of a gymnosperm. (9) Write the appropriate names of each of the following fruits: a pineapple, a grape, a black pepper, a colocynth, and a juniper fruit. (10) Draw a diagram of a complete dicotyledonous embryo, pointing out and correctly naming each of its parts.

COMMITTEE.

G—*Diluted Hydrobromic Acid.* (1) What is its official name? (2) What is its percentage strength? (3) Give a process for its manufacture. (4) What is its specific gravity? Should it be completely volatilized by heat? and why? (5) What are its medicinal properties and dose?

H—Describe the following classes of official preparations. Give the official title and mode of preparation of one of each class. (1) Mucilages. (2) Emulsions. (3) Mixtures. (4) Infusions. (5) Glycerites.

I—A pharmacist made a compound mustard liniment by mixing 3 per cent. of volatile oil of mustard, 20 per cent. of fluid extract of meze-reum, 10 per cent. of oil of camphor, 15 per cent. of castor oil, with sufficient alcohol to make ten litres. How many c.c. of each ingredient did he use? (Percentage by measure being understood without allowance for contraction.) How many bottles, each to contain 500 grams of the liniment, would this quantity fill if its specific gravity was 0.850?

K—What antidotes should be administered at once for poisonous doses of—(1) Corrosive sublimate. (2) Ammonia water. (3) State how you would prepare an emergency antidote for arsenous acid. (4) What precautions are necessary in administering antidotes?

OPERATIVE PHARMACY.

The Junior Examination in Operative Pharmacy was held on Saturday, March 2, 1895. The work exacted was the making of solution of ferric sulphate, mass of mercury, and granulated sodium acetate.

PHARMACOGNOSY.

The Junior Examination in Pharmacognosy was held on Saturday, March 9, 1895. The students were divided into three sections. Numbered specimens of drugs were given them for examination, and they were required to answer the following questions :

QUESTION 1.

A—(1) Rhizome or root? (2) Monocotyl or dicotyl? (3) Official name of drug? (4) What test applied for starch? (5) Result of test for starch? (6) What test applied for tannin? (7) Result of test for tannin?

B—Draw diagram of cross-section at least twice natural size, and point out the following parts: (1) Meditullium. (2) Cambium zone (if present). (3) A medullary ray (if present). (4) The endophloem (if present). (5) The pith (if present).

QUESTION 2.

A—Describe leaf or leaflet, with reference to the following points: (1) General outline. (2) Base. (3) Apex. (4) Margin. (5) Upper surface. (6) Under surface. (7) Texture. (8) Venation.

B—Make drawing of leaf or leaflet, writing underneath it the botanical name of the plant and the official name of the drug. Also point out in the drawing: (1) The petiole or the petiolule (if present). (2) One of the stipules (if stipules are present). (3) The midrib of a lamina (if a midrib is present).

QUESTION 3.

A—*The Flower.* (In describing it, use the appropriate botanical terms). (1) Kinds of organs present? (2) Numerical plan? (3) Symmetry? (4) Regularity? (5) Insertion (*a*) of calyx; (*b*) of corolla; (*c*) of stamens? (6) Cohesion (*a*) of calyx; (*b*) of corolla; (*c*) of stamens; (*d*) of pistils?

B—Draw a diagram of the ground plan of the flower, indicating the correct number and relation of parts, the number of lobes of the anthers, the direction in which the anthers face, and the placentation of the ovary.

QUESTION 4.

A—*The Fruit.* (1) Apocarpous or syncarpous? (2) If syncarpous, number of carpels? (3) Inferior or superior? (4) If dehiscent, the mode of dehiscence? (5) Placentation? (6) Simple, aggregated, or multiple? (7) Proper name of fruit?

B—Draw diagram of cross-section of fruit, showing number of loculi, mode of placentation, and point out a false partition, if any false partitions are present.

QUESTION 5.

A—*The Seed.* (1) Atropous, anatropous, campylotropous or amphitropous? (2) Texture of testa? (3) Albuminous or exalbuminous? (4) Texture of albumin, if albumin is present? (5) Does the kernel of the seed possess starch? (6) Embryo monocotyledonous, dicotyledonous, or polycotyledonous?

B—Draw a diagram of the vertical section of the seed, and point out such of the following parts as are present: (1) Hilum. (2) Micropyle. (3) Chalaza. (4) Raphe. (5) Albumen. (6) Embryo.

The specimens in each section were as follows:

<i>First Section.</i>	<i>Second Section.</i>	<i>Third Section.</i>
Root: Taraxacum.	Pyrethrum.	Podophyllum.
Leaf: Uva Ursi.	Gaultheria.	Buchu.
Flower: Azalea.	Viola Tricolor.	Tulip.
Fruit: Illicium.	Poppy Capsule.	Cardamom.
Seed: Amygdala Amar.	Castor Bean.	Pepo.

Senior Examination.—The examination of the senior class for the degree of Graduate in Pharmacy commenced with that in Operative Pharmacy on Saturday, March 23d. On Monday, the 25th, the one on Analytical Chemistry was held, followed by the written examinations in the other branches. The following are the questions :

THEORY AND PRACTICE OF PHARMACY.

A—Opium. (1) Can the value of opium be judged by its physical properties? (2) What reliable methods are employed to ascertain its value? (3) What is the average difference in strength between opium and powdered opium? (4) In what proportions may four quantities of powdered opium containing respectively 7, 8, 16 and 18 per cent. of morphine, be mixed so that the mixture shall contain 14 per cent. of morphine?

B—Give the synonym, unabbreviated official or Latin name, ingredients, brief outline of process, and describe the appearance of: (1) Mitigated caustic. (2) Yellow mercurous iodide. (3) Milk of asafœtida. (4) Hoffmann's anodyne. (5) Spirit of glonoin. (6) Chloroform liniment. (7) Tincture of strophanthus. (8) Elixir of vitriol.

C—Give the official name, English name, ingredients, brief outline of process, and describe the appearance of: (1) Liquor magnesii citratis. (2) Syrupus picis liquidæ. (3) Spiritus ammoniæ aromaticus. (4) Syrupus rhei. (5) Tinctura veratri viridis. (6) Pilulæ ferri carbonatis. (7) Unguentum iodi. (8) Emplastrum ammoniaci cum hydrargyro.

D—(1) How is salicylic acid made? (2) What is the principal objection to prescribing it in simple aqueous solution? (3) Name three official salts of the acid. (4) What official liquid is made from the acid? (5) Describe the physical properties of this liquid. (6) Give the official name of the salicylic ether of phenol. (7) Describe its appearance and physical properties. (8) What are its medical properties? (9) What is its dose? (10) How is it usually administered?

E—(1) How is turpentine obtained? (2) Describe its appearance. (3) What commercial products are obtained by distilling it? (4) What products are obtained by distilling the results of the distillation? (5) What is terebene? (6) How is it made? (7) What is its dose? (8) How is it best administered?

F—(1) How is aloe purificata made? (2) Name seven official preparations (giving full official titles) into which it enters. (3) What is the active principle of each official aloe? (4) How may they be distinguished from each other by a chemical test?

G—(1) In compounding prescriptions, state under what circumstances it is advantageous to aid the solution of a solid by heating it with the solvent. (2) State when it is proper to filter a prescribed liquid preparation, and explain why, for certain reasons, filtration sometimes should not be resorted to. (3)

When is it permissible to make an addition to a prescription without the consent of the prescriber? Give reasons for your answer. (4) Is it desirable, when renewing a prescription, to follow the order of mixing the ingredients originally used? If so, why?

H—Pills. (1) What physical properties are essentially required in forming a good pill mass? (2) Give reasons for each requirement. (3) What is a pill excipient? (4) Give reasons (and illustrate by a practical example) for selecting either of the following excipients: water, syrup of acacia, glycerin, glucose, soap, confection of rose.

*I—*Criticise and translate the following prescriptions. Write out the English names of each ingredient, with quantities. State how you would compound each, and if any incompatibility would be developed in either, state what it is, and what would be the proper procedure:

R Hyd. Bichlor., gr. j.
Pot. Iod.
Fer. et Am. Cit., āā ʒ iij.
Tinct. Cinch. Co., f ʒ iss.
℥. ft. Sumat drachmam ter in die. S.
R Ext. Secale Cornut. Fld., f ʒ i.
Vin. Ejusdem, f ʒ i.
Sacch. Alb., ʒ ss.

℥. S.—One teaspoonful every two or four hours, as needed. C.

*K—*Criticise and translate the following prescriptions. Write out, with English names, the ingredients and quantities. State whether you would compound them as written, or what course you would pursue upon receiving them:

R Mist. Digitalis Comp., f ʒ ij.
Tinct. Gentian Comp.
Tinct. Cinchon. Comp., āā f ʒ i.
Morph. Sulphat., gr. x.

℥. S.—Two teaspoonfuls three times a day (in water).

R Colchicine.
Aconitine.
Emetine.
Sulph. Calcium, āā gr. x.

℥. ft. in Caps., No. x. Sig.—One every three hours.

CHEMISTRY.

A—(1) Give the official name and chemical formula for nitre. (2) State the sources of nitre, and describe how it is made commercially. (3) State the physical and chemical characters and tests by which nitre can be recognized. (4) Give the uses of nitre, whether in medicine, in the arts, or for general purposes.

B—(1) Give the proper chemical name and formula of *sodii hyposulphis*. (2) How is the salt made commercially? (3) State the physical and chemical tests by which it can be distinguished from *sodii sulphis*. (4) What are the most important applications of this compound?

C—(1) Describe the occurrence of the element copper, mentioning its most important minerals. (2) Describe the metal and note its most important physical and chemical characters. (3) Mention the most important alloys of copper, stating their several components. (4) What is the composition of the several green copper pigments? (5) What is the effect of adding ammonia to a solution of a copper salt?

D—(1) Describe the metal bismuth. (2) Give the formulas of bismuth chloride, of bismuth oxychloride, of the normal nitrate, of *bismuthi subnitratis* and of *bismuthi subcarbonatis*. (3) Mention some of the alloys of bismuth, and state their character and uses. (4) How is bismuth distinguished in the course of qualitative analysis?

E—(1) State the formula of *acidum chromicum* and give its proper chemical name. (2) Write the reaction for its production. (3) Give the formulas of potassium chromate and potassium dichromate respectively, and state what physical and chemical differences in properties exist. (4) Give the formula of "chrome alum," and describe it.

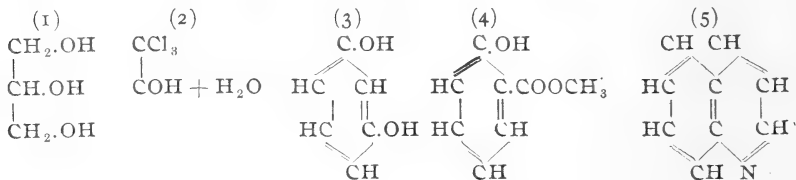
F—(1) Give the exact chemical name and formula for chloroform. (2) From what several sources is it obtained? (3) Explain the production in each case by the use of reactions. (4) Describe chloroform, and give the pharmacopœial test for its purity.

G—(1) To what chemical class do the fatty oils belong? (2) Mention the proximate constituents usually contained in them. (3) Write several reactions for the decomposition of these proximate constituents. (4) Enumerate official compounds which are obtained as the result of these reactions. (5) State what technically important industries are based on these reactions.

H—(1) Give the exact chemical name and graphic formula of aniline. (2) Show by reactions how it is derived from benzene. (3) How is *acetanilidum* made? (4) What are its physical, chemical and therapeutic properties? (5) Write the graphic formula of para-bromacetanilid and methylacetanilid.

I—(1) What is a terpene, and what are the most characteristic reactions of this class of bodies? (2) What is a camphor? What classes of chemical compounds are included under this name? (3) What are essential oils, and what is their general chemical composition? (4) How are the resins related to the preceding classes of compounds? (5) Into what groups may the resins be divided?

K—Give the correct chemical names for the following :



MATERIA MEDICA AND BOTANY.

I—*Botany.* (1) Name three proteids different from ordinary protoplasm that frequently occur in vegetable cells. (2) Classify and name the different varieties of vascular bundles that occur in plants. (3) What is the essential tissue of phloem and what is the essential tissue of xylem? (4) State the two most

important uses of vascular bundles. (5) Name the variety of bundle that is the most common respectively in roots, in the stems of Pteridophyta, in the stems of pines, and in leaves. (6) In what natural order of plants may we look for stems having bi-collateral bundles? (7) Name the series and class to which each of the following plants belong: *Bacillus tuberculosis*, *Cetraria Islandica*, *Claviceps purpurea*, *Lycopodium clavatum*, and *Chenopodium ambrosioides*.

II—Materia Medica. (8) How do the drugs *calamus* and *podophyllum* differ (a) in the kind, and (b) in the distribution of their vascular-bundles? Explain by aid of diagrams. (9) What acrid rhizome-and-root drug is easily distinguished from other official drugs by the conspicuously 4-rayed (or rarely 3- or 5-rayed) medullium of its roots? (10) What two bark drugs are readily distinguishable from other official barks by the fact that solutions of the caustic alkalies turn them a deep red? (11) Write the pharmacal names of three official leaf-drugs which are characterized by the possession of internal glands which cause them to appear pellucid-punctate when held up to the light. (12) Name three official drugs, each powerfully sialagogue, one a leaf-drug, one a bark-drug and the other a root-drug. (13) Name a bark-drug, a root drug, and a seed-drug, each official and each derived from the natural order Apocynaceæ. (14) Write the botanical names and natural orders of the plants furnishing the following drugs: cloves, wild cherry, and prickly ash. (15) By means of what chemical test may guaiac wood be easily distinguished from other medicinal woods? (16) State the botanical origin of each of the following: coca, cacao and coconut oil. (17) Name one example each of official vegetable drugs, chiefly valuable for the following properties: refrigerant, antispasmodic, analgesic, and myotic. (18) Name the official drugs which are the sources of the following active principles: eserine, thebaine, allyl sulphocyanide, veratrine, and brucine. (19) Name three mydriatic alkaloids. (20) Name two drugs which powerfully antagonize each other in the effects they have upon the glands of the skin, one promoting diaphoresis, the other diminishing it. (21) Name a drug that is used as a physiological antidote in opium poisoning. (22) Name a diuretic drug that produces diuresis indirectly by raising the blood pressure. (23) Name one emetic drug that produces emesis by direct action on the vomiting centre in the medulla, and another that produces it by direct action on the stomach. (24) Name three cholagogue cathartic drugs of vegetable origin. (25) Name three hydragogue cathartic drugs of vegetable origin.

COMMITTEE.

A—A druggist made a dentifrice from the following ingredients:

15	pounds	powdered orris root	@	\$0.40	per pound.
5½	"	" cuttle fish	@	.30	" "
10	"	" myrrh	@	.50	" "
413	grains	otto of rose	@	8.75	per ounce.
7	ounces	24½ grains French carmine @		10.00	per kilogram.
		Sufficient precipitated chalk	@	.06	per pound to make 100 pounds.

What would the whole quantity cost?

What percentage of profit would he make if he sold it at 80 cents per pound (no charge being included for labor or time)?

Show all figures used in obtaining your answer on this sheet of paper.

B—Pepsin. (1) Give the official name of pepsin. (2) What is the official description? (3) Is it a chemical compound? (4) What are its medical uses? (5) How is its value estimated? (6) Describe a process for making scale pepsin.

C—Silver. (1) How does silver usually occur in nature? (2) Give its symbol and atomic weight. (3) Give its specific gravity. (4) Describe two tests for silver salts. (5) Name six official preparations of silver. (6) How may its oxygen compound be prepared? (7) What official precautions should be observed in dispensing this substance?

D—Massa Hydrargyri. (1) What ingredients are used in preparing it? (2) What percentage of metal does it contain? (3) Give the common names for this preparation. (4) Why is long-continued trituration necessary? (5) Give a test for absence of mercuric oxide. (6) Give a test for limit of mercurous oxide. (7) What are its medical properties? (8) What is its dose?

E—Spanish Flies. (1) Give the official title, the Latin name of the insect and the order to which it belongs. (2) Give the commercial sources of this drug. (3) Which flies are most highly esteemed, and how may they be recognized? (4) Give the name of the vesticating principle. What is its best solvent? (5) Give a process for obtaining this principle. What is the usual percentage of it in Spanish flies? (6) Name the official preparations of Spanish flies, and give the ingredients of each. (7) What are the medical properties and dose of Spanish flies? (8) How does the official process for blistering cerate differ from that of the previous Pharmacopœia?

F—Potassium Hydrate. (1) Give a method of preparing potassium hydrate. (2) In what form does it usually occur in the shops? (3) Describe (*a*) the physical and (*b*) the chemical properties of the official compound. (4) What impurities are liable to be present? (5) What is the quantitative method of determining its value. (6) Give four reagents for the detection of potassium salts.

G—(1) How would you distinguish a root-drug from a rhizome-drug. (2) Write the pharmacal names of two root-drugs which possess laticiferous tissue. (3) Write the pharmacal name of a monocotyl rhizome-drug that contains oleo-resin cells. (4) Write the pharmacal names of two drugs, one a root-drug and the other a bark-drug, each of which contains mucilage cells. (5) Write the name of the most potent principle in each of the following drugs: Digitalis, veratrum viride and jaborandi. (6) Name three poisonous alkaloids, one derived from a root-drug, one from a leaf-drug and the other from a seed-drug. (7) Name a fruit-drug, which, on pulverization and treatment with solution of potassium hydrate, emits a volatile alkaloid which has an odor similar to that of mice. (8) Name a bark-drug from which, on heating in a test tube, there is distilled a purple liquid that accumulates in droplets on the cooler portions of the tube. (9) Name two official drugs, both of which, in medicinal doses, slow the heart's action, but one strengthens it, while the other greatly depresses it. (10) Name a cholagogue bark-drug and a cholagogue rhizome-drug.

H—Iron. (1) What two well-defined series of compounds does this metal form? (2) State the valence of each series. (3) How is reduced iron made? (4) What compounds of iron with the halogens are official? (5) What three forms of ferrous sulphate are official? (6) What iron salt is contained in "Liquor Ferri Tersulphatis?" (7) How does "Monsel's Solution" differ in the character of its iron compound from "Liquor Ferri Tersulphatis?"

(8) In the making of the official solution of ferric chloride, how is the acidulated solution of the ferrous chloride oxidized, and what is the special order of mixing the acidulated solution and the oxidizing agent? Is the former added to the latter or the reverse, and why?

I—Give the official title, botanical name of plant, natural order, habitat and active principle of each of the following drugs: (1) Aconite. (2) Deadly nightshade. (3) Yerba Santa. (4) Hops. (5) Calabar bean.

K—(1) Write a prescription for a 100 c.c. solution to contain chloral hydrate, hyoscine hydrobromate and sodium bromide, with a proper adjuvant and vehicle; adjust the doses for a soporific for an adult patient; express the quantities metrically, and use the unabbreviated official names of the ingredients. Let the signa be: Take 4 c.c. at bedtime; repeat in two hours if necessary.

SPECIMENS.

The following specimens were placed before the students for identification during the respective examinations:

Pharmacy.

(1) Glycerinum. (2) Aqua camphoræ. (3) Emulsum chloroformi. (4) Ceratum cantharidis. (5) Pulvis cretæ compositus. (6) Pulvis glycyrrhizæ compositus. (7) Spiritus juniperi compositus. (8) Extractum ergotæ fluidum. (9) Tinctura calumbæ. (10) Tinctura gentianæ composita.

Chemistry.

(1) Aqua. (2) Sulphur sublimatum. (3) Amylum. (4) Ammonii carbonas. (5) Magnesii carbonas. (6) Acidum boricum. (7) Acidum gallicum. (8) Acidum tartaricum. (9) Plumbi acetas. (10) Benzinum.

Materia Medica.

(1) Senega. (2) Pyrethrum. (3) Iris. (4) Convallaria. (5) Viburnum opulus. (6) Mezereum. (7) Pilocarpus. (8) Santonica. (9) Anisum. (10) Stramonii semen.

Committee.

(1) Terebinthina. (2) Inula. (3) Carum. (4) Potassii carbonas. (5) Acidum boricum. (6) Acidum benzoicum. (7) Liqueur ammonii acetatis. (8) Oleum picis liquidæ. (9) Pulvis rhei compositus. (10) Tinctura cardamomi composita.

OPERATIVE PHARMACY.

Write your name and examination number on each label. Restore all containers to their proper places before leaving. Articles marked with an asterisk (*) are weighed.

(1) Syrup of Ferrous Iodide.

Iron Wire,	2.5 gm.
*Iodine,	8.3 gm.
Water,	15 c.c.
Syrup, q. s.	75 c.c.

Make Syrup of Ferrous Iodide, U. S. P.

N. B.—The syrup for the above should be made by the following formula:

*Sugar,	64 gm.
Water, q. s.,	75 c.c.

Make syrup.

(2) *Ointment of Mercuric Nitrate.*

*Mercury,	2.5	gm.
Nitric Acid,	2	c.c.
Nitric Acid,	3	c.c.
Lard Oil,	30	c.c.

Make Ointment of Mercuric Nitrate by the official process.

(3) *Pills.*

Ferrous Sulphate,	4	gm.
Potassium Carbonate,	2	gm.
Sugar, powd.,	1	gm.
Tragacanth, . . . . .	.25	gm.
Althæa, powd., . . . . .	.25	gm.
Glycerin,		
Water, āā,	3	drops.

Make 25 pills; coat with silver.

N. B.—The silver leaf will be found in the pill-box.

(4) *Powders.*

Cinchonine Sulph.,	3.5	gm.
Glycyrrhiza, powd.,	1	gm.

Mix; make 12 powders.

(5) *Suppositories.*

Alc. Ext. of Belladonna leaves, . . . . .	.50	gm.
Tannic Acid, . . . . .	.50	gm.
Oil of Theobroma,	6	gm.

Make 6 suppositories, by rolling.

ANALYTICAL CHEMISTRY.

The examination in this branch consisted in submitting to each student a mixture of three, four or five salts, to analyze qualitatively. The time allowed was two hours.

MICROSCOPY.

Part 1.—From the stem given you for study, first prepare several thin transverse, longitudinal-radial and longitudinal-tangential sections, placing some of each kind in water and the rest in alcohol until required for use. Then proceed to the study of the sections, applying such reagents or stains as are necessary to enable you to answer the following questions:

(1) Is the stem that of a fern, that of a monocotyl, that of a gymnosperm, or that of a dicotyl? State reasons for your conclusion. (2) If vascular bundles are present, to what type and variety do they belong? (3) What lignified tissues are present in the area enclosed by the cambium zone? (4) What lignified tissues occur in the area exterior to the cambium zone? (5) What layers of the bark are present in this stem? (6) Of how many rows of cells are the medullary rays composed? (7) Is starch present? What test did you apply to determine? (8) What kinds of secretion-sacs, if any, are present? (9) Is collenchyma present? If so, in what part of the stem does it occur, and how does it differ from parenchyma? (10) What reagent could you use that would stain the cellulose membranes blue or purple and the lignified and cutinized ones brown or yellowish-brown?

Part 2.—Draw, under a magnification of seventy-five diameters or upward, a wedge-shaped segment, including about one-sixth of the cross-section and extending from the periphery to the centre of the section. Then, by means of index lines, point out such of the following parts as are present :

(1) A parenchyma cell. (2) The area in which sieve tissues occur. (3) A stone cell. (4) Some meristem tissue. (5) A duct in the xylem of a bundle.

SEVENTY-FOURTH ANNUAL COMMENCEMENT.

The exercises connected with conferring the degree of Graduate in Pharmacy were held at the Academy of Music, Wednesday evening, April 17th, at 8 o'clock.

President Charles Bullock conferred the degree upon the following :

<i>Name.</i>	<i>Subject.</i>	<i>State.</i>
Aley, Hamilton, Jr.,	<i>Spiritus ammoniæ aromaticus,</i>	New York.
Anewalt, Ellsworth Quincy,	<i>Sambucus Canadensis,</i>	Pennsylvania.
Bacon, Edwin Gray,	<i>Gum arabic,</i>	New Jersey.
Baddour, Joseph Selim,	<i>Tobacco,</i>	Syria.
Bailey, John,	<i>Opium,</i>	Delaware.
Ball, William Ernest,	<i>Saw palmetto,</i>	Pennsylvania.
Barnitz, Harry L.,	<i>Old remedy,</i>	Pennsylvania.
Barr, Elwyn Paul,	<i>Prunus Virginiana,</i>	Pennsylvania.
Binns, Harry R.,	<i>Oleum ricini,</i>	Pennsylvania.
Blair, Charles Lee,	<i>Tincture of myrrh,</i>	Pennsylvania.
Boyd, Roger,	<i>Aspidosperma,</i>	Georgia.
Brendel, Frederick Charles,	<i>Organic chemistry,</i>	Ohio.
Branin, Fred. Winston,	<i>Zingiber officinale,</i>	New Jersey.
Brockman, Frank William,	<i>Benzoin,</i>	Pennsylvania.
Brooks, Joseph Warren,	<i>Permanganate of Potassium,</i>	New Jersey.
Brunhouse, Frederick, Jr.,	<i>Sulphur sublimatum,</i>	Pennsylvania.
Brunier, George Franklin,	<i>Glycerin,</i>	Pennsylvania.
Bucher, William Lewis,	<i>Strophanthus,</i>	Pennsylvania.
Bundy, Clinton Thomas,	<i>Belladonna,</i>	Ohio.
Cain, Maude Florence,	<i>Lanolin,</i>	Pennsylvania.
Campbell, Andrew,	<i>Liquor potassii arsenitis,</i>	Pennsylvania.
Campbell, Thos. P. V.	<i>Preservation of medicines,</i>	Pennsylvania.
Carpenter, Edward Albert,	<i>Pills,</i>	Texas.
Carter, Charles Franklin,	<i>Syrupus ferri iodidi,</i>	Ohio.
Cavanaugh, Chas. Joseph,	<i>Emulsions,</i>	Pennsylvania.
Chatham, John Eliason,	<i>Kola nut,</i>	Pennsylvania.
Coffey, Maurice Grant,	<i>Successful Pharmacist,</i>	Pennsylvania.
Colsten, George Henry,	<i>Camphora,</i>	Pennsylvania.
Conard, Norman Shoemaker,	<i>Digitalis and strophanthus,</i>	Pennsylvania.
Conrey, Henry Slicer,	<i>Coca,</i>	Maryland.
Coppenhaver, Chas. Brewster,	<i>Pilocarpus,</i>	Pennsylvania.
Davies, William Richard,	<i>Kola acuminata,</i>	Pennsylvania.
Davis, Robert Goode,	<i>Ginger,</i>	Arkansas.
Dean, Guy Stewart,	<i>Eucalyptus,</i>	Ohio.

Name.	Subject.	State.
Durand, Arthur John,	<i>Pharmacy vs. tablet triturates,</i>	New Jersey.
Durbin, John George,	<i>Syrupus acidi hydriodici,</i>	Pennsylvania.
Eberly, David Alexander,	<i>Ancient history of pharmacy,</i>	Pennsylvania.
Ellis, David,	<i>Menthol,</i>	Pennsylvania.
Farnsworth, Anthony,	<i>Fucus vesiculosus,</i>	Pennsylvania.
Faunce, Benjamin Rice,	<i>Cocillana,</i>	Pennsylvania.
Fisher, Edmund Keim,	<i>Menthol,</i>	Pennsylvania.
Flitcraft, Warren Whitney,	<i>Cochineal,</i>	New Jersey.
Foresman, Harry Bastian,	<i>Acetic acid as an extractive,</i>	Pennsylvania.
Freethy, Charles Henry,	<i>Medicated wines,</i>	Pennsylvania.
Geuther, Frederick Edwin,	<i>Tinctura nucis vomicæ,</i>	Pennsylvania.
Greenawalt, David Lehman,	<i>Examination of lime water,</i>	Pennsylvania.
Grotz, Milton,	<i>Success of the American pharmacist,</i>	Pennsylvania.
Hahn, Edward Titus,	<i>Hypodermic tablets,</i>	Pennsylvania.
Hamilton, Walter Scott,	<i>Guarana,</i>	Oregon.
Haney, Mary Augusta,	<i>Disinfectants,</i>	Maine.
Herbert, Thomas Lewis,	<i>Aluminum,</i>	Pennsylvania.
Hering, Edwin Arney,	<i>Euonymus bark,</i>	Pennsylvania.
Herrmann, William,	<i>Acidum aceticum,</i>	Pennsylvania.
Hetrick, Annie Louise,	<i>Belladonna,</i>	Pennsylvania.
Heysham, Horace Besson,	<i>Aconitum, U.S.P.,</i>	Pennsylvania.
Hodge, Wm. Roseborough,	<i>Belladonna,</i>	Tennessee.
Hollopeter, Arthur Stadiger,	<i>Urethral suppositories,</i>	Pennsylvania.
Hoopes, Willmer Preston,	<i>Saccharum lactis,</i>	Maryland.
Hoskins, John,	<i>Saw palmetto,</i>	Pennsylvania.
Hughes, Harry Bittenbender,	<i>Liquor calcis,</i>	Pennsylvania.
Hummel, David Fox,	<i>Atropa belladonna,</i>	Pennsylvania.
Hunter, Henry Blount,	<i>Metallic stearates,</i>	N. Carolina.
Hyers, Percy,	<i>Fluid extract of cubeb,</i>	Ohio.
Jackson, Robert MacGregor,	<i>Pills and pill excipients,</i>	Nova Scotia.
Jones, Charles Lyston,	<i>Glycyrrhiza,</i>	Delaware.
Kalbach, Charles Peter,	<i>Incompatibility,</i>	Pennsylvania.
Kalkman, Henry Alfred,	<i>Coca and its alkaloid,</i>	Pennsylvania.
Kauffman, John Wm.,	<i>Resorcin,</i>	Pennsylvania.
Kaufman, Reuben M.,	<i>Pharmacy,</i>	Pennsylvania.
Kellner, Henry Chas. Fred'k,	<i>Pharmacy,</i>	Pennsylvania.
Kelly, Francis Patrick,	<i>Antiseptics,</i>	Pennsylvania.
Kercher, Edwin Harry,	<i>Microscopy,</i>	Pennsylvania.
King, Albert Joseph,	<i>Peumus boldus,</i>	Pennsylvania.
Kline, Harry Herbert,	<i>Linaria vulgaris,</i>	Pennsylvania.
Knauer, August Henry,	<i>Jamaica dogwood,</i>	Pennsylvania.
Labbé, Edward Blaise,	<i>Assay of resin podophyllum,</i>	Oregon.
La Master, Harvey Gillette,	<i>Camphora,</i>	Kansas.
Lambert, Herbert Grayson,	<i>Tablet triturates,</i>	Virginia.
Lancaster, Brenton Solomon,	<i>Antitoxin,</i>	Pennsylvania.
Lanius, Ross McDonald,	<i>Glycerin suppositories,</i>	Pennsylvania.
La Rue, Willis Leslie,	<i>Fluid extracts,</i>	Pennsylvania.
Lau, Scott Wolford,	<i>Disinfectants,</i>	Pennsylvania.

Name.	Subject.	State.
Lauer, Emanuel Hiram,	<i>Epiphegus Virginiana</i> ,	Oregon.
Lawton, Henry Cuthbert,	<i>Vaccine virus</i> ,	Nova Scotia.
Leaman, Davis Hendrix,	<i>Ipecacuanha</i> ,	Pennsylvania.
Leedom, Morris,	<i>Ethylenediamine</i> ,	Pennsylvania.
Lehman, Joseph David,	<i>Hydrastis Canadensis</i> ,	Pennsylvania.
Lewis, Arthur Rimmer,	<i>Oleum gossypii seminis</i> ,	Texas.
Linn, William Elliott,	<i>Camphora</i> ,	Pennsylvania.
Long, Charles Henry,	<i>Acetic acid</i> ,	Pennsylvania.
Long, John Grier,	<i>Benzoin</i> ,	Pennsylvania.
Lorenz, Charles Gustave,	<i>Fluid extracts and changes</i> ,	Pennsylvania.
Loser, Damon Aloysius,	<i>Opium</i> ,	Pennsylvania.
Lower, George Grafley,	<i>Jaborandi</i> ,	Pennsylvania.
Lutz, Walter Preston,	<i>Heat and cold</i> ,	New Jersey.
McCanna, John Milton,	<i>Oleum morrhueæ</i> ,	Pennsylvania.
McClosky, Wilson Cathcart,	<i>Benzinum</i> ,	Pennsylvania.
McFadden, Thos. Francis Jos.,	<i>Botany</i> ,	Nevada.
McGhee, Saylor John,	<i>Chocolate</i> ,	Pennsylvania.
McNair, William Righter,	<i>Vegetable coloring matters</i> ,	Pennsylvania.
Mackenzie, Edwin Golding,	<i>Pernanganate of potash</i> ,	Delaware.
Macphee, Thomas Duncan,	<i>Peppermint</i> ,	Nova Scotia.
Mader, Elias,	<i>Taraxacum</i> ,	Pennsylvania.
Manko, Emanuel,	<i>Asbestos</i> ,	Pennsylvania.
Mathews, William Joseph,	<i>Sodii boras</i> ,	Pennsylvania.
Mayhew, Charles Holmes,	<i>Cinchona</i> ,	New Jersey.
Melick, Ralph La Shelle,	<i>Chemistry</i> ,	Pennsylvania.
Michener, Elmer David,	<i>Belladonna</i> ,	Pennsylvania.
Miller, Albert T.,	<i>Tablet triturates</i> ,	Pennsylvania.
Miller, Harper Guiley,	<i>The metric system</i> ,	Pennsylvania.
Minton, Henry McKee,	<i>Castor oil</i> ,	Pennsylvania.
Mitchell, Albert Tippet,	<i>Pharmaceutical assay</i> ,	Pennsylvania.
Moosbrugger, Charles Otto,	<i>Elder bark</i> ,	Ohio.
Moritz, Birdis Emanuel,	<i>Ichthyocola</i> ,	Pennsylvania.
Morris, Max,	<i>Yucca filamentosa</i> ,	Georgia.
Murphy, Michael Charles,	<i>Wines</i> ,	Pennsylvania.
Musselman, Morris Myers,	<i>Poisons and their antidotes</i> ,	Pennsylvania.
Myers, William Henry,	<i>Patent medicines</i> ,	Pennsylvania.
Naly, Sarah Lusan,	<i>Microscopical laboratory</i> ,	Pennsylvania.
Nickum, James Weller,	<i>Anatolian licorice root</i> ,	Utah.
Nugent, Thomas Francis,	<i>A drug store</i> ,	New York.
Parse, John Merritt,	<i>Camphora</i> ,	New Jersey.
Pazmiño, Francisco,	<i>Tinctura Gallæ</i> ,	Ecuador.
Peabody, William Legoria,	<i>Tannin of cloves</i> ,	Missouri.
Phillips, Oscar Wilson,	<i>Pyroxylinum</i> ,	Ohio.
Porter, John Morris,	<i>Incompatibility</i> ,	Pennsylvania.
Porter, William Edgar,	<i>Cocillana</i> ,	Pennsylvania.
Quick, Benj. Chamberlain,	<i>Strophanthus hispidus</i> ,	New York.
Rabenau, Arwed Gustav,	<i>Electrolysis</i> ,	Germany.
Rectenwald, Louis Aloysius,	<i>Jambul seed</i> ,	Pennsylvania.

<i>Name.</i>	<i>Subject.</i>	<i>State.</i>
Reeser, Richard,	<i>Oleum ricini,</i>	Pennsylvania.
Regar, Daniel Schaeffer,	<i>Theobroma cacao,</i>	Pennsylvania.
Reich, Solomon Mittler,	<i>Manna and mannit,</i>	West Virginia.
Rhoads, Edward Elliott,	<i>Acetic acid,</i>	Pennsylvania.
Richardson, Arthur Norris,	<i>Achillea millefolium,</i>	Indiana.
Richman, Edward Milton,	<i>Erythroxylon Coca,</i>	New Jersey.
Ridenour, William Edward,	<i>Some chinaphilin derivatives,</i>	Ohio.
Ridgway, Wm. Frederick,	<i>Commercial syrup of hydriodic acid,</i>	Washington.
Ritter, Frederick William,	<i>Eridictyon glutinosum,</i>	Pennsylvania.
Robbins, George Delbert,	<i>Eugenia caryophyllata,</i>	Indiana.
Rock, Peter Joseph,	<i>Cotton plants and derivatives,</i>	Nebraska.
Roessner, Frank George,	<i>Preparations of sanguinaria,</i>	Pennsylvania.
Rossman, George Albert,	<i>Emulsions,</i>	Pennsylvania.
Rothwell, Walter,	<i>Emulsion of cod liver oil,</i>	Pennsylvania.
Sames, Joseph Howard,	<i>Cicuta maculata,</i>	Pennsylvania.
Schmitt, Albert Herman,	<i>Tasteless fluid extract of cascara sagrada,</i>	California.
Schrack, Robert Franklin,	<i>Glycerin,</i>	Pennsylvania.
Semple, Henry Beidleman,	<i>Fluid extract of kola,</i>	Pennsylvania.
Semple, John,	<i>Education in pharmacy,</i>	Pennsylvania.
Shimer, Miles Herman,	<i>Camphora,</i>	Pennsylvania.
Shoemaker, Clinton Llewellyn,	<i>Solanum Carolinense L.,</i>	Pennsylvania.
Simonis, Otto, Jr.,	<i>Glycerin suppositories,</i>	Pennsylvania.
Simons, Harry Fisher,	<i>The pharmacist,</i>	Pennsylvania.
Skinner, Harry Wharton,	<i>Cod liver oil,</i>	Pennsylvania.
Slifer, Leo Engelman,	<i>Belladonna.</i>	Pennsylvania.
Smith, Charles Hye,	<i>Successful pharmacist,</i>	Delaware.
Smith, Rodney,	<i>Benzoinum,</i>	Pennsylvania.
Stengel, Arthur,	<i>Benzoic acid,</i>	Pennsylvania.
Stephen, Annie Rex,	<i>Tinctures,</i>	Pennsylvania.
Stephen, Walker Lewis,	<i>The chemist,</i>	Pennsylvania.
Stern, Charles Wilson,	<i>Cream of bismuth,</i>	Delaware.
Strickler, George, Jr.,	<i>Gum arabic,</i>	Pennsylvania.
Stuart, Robert Cummins,	<i>Belladonna,</i>	Texas.
Swartz, Edward F.,	<i>Malt,</i>	Pennsylvania.
Tarr, Robert H.,	<i>General chemistry,</i>	Ohio.
Terne, Henry Bruno,	<i>Animal refuse,</i>	Pennsylvania.
Terry, John Herman,	<i>Suppositories,</i>	Tennessee.
Thayer, Guy Parker,	<i>Heuchera Americana,</i>	Ohio.
Thompson, Nathan Lincoln,	<i>Examination of kola,</i>	Vermont.
Thornton, Thomas Redman,	<i>Tannin of cassia,</i>	Georgia.
Ulmer, Stephen E.,	<i>Metric system,</i>	Pennsylvania.
Ulrich, Julius Hirsch,	<i>Acetic acid as a solvent,</i>	Illinois.
Unangst, Harvey Edgar,	<i>Fluid extracts by pressure,</i>	Pennsylvania.
Van Korb, William,	<i>Rhubarb,</i>	New York.
Warfel, Wm. Sylvester,	<i>Syrupus acidi hydriodici,</i>	Pennsylvania.
Waters, Thomas Carey,	<i>Analysis of a liquid,</i>	Pennsylvania.
Watson, Walter Wilmer,	<i>Anæsthetics,</i>	Pennsylvania.

Name.	Subject.	State.
Weaver, Wilmer John,	<i>Vaccine virus,</i>	Pennsylvania.
Webb, John Karl,	<i>Spiritus ætheris nitrosi,</i>	Mississippi.
Webbert, Harry Sigler,	<i>Cellulose,</i>	Pennsylvania.
Weiser, Spencer Bucher,	<i>Syrup by cold process,</i>	Pennsylvania.
Welsh, Robert Emmet,	<i>Pepsin,</i>	Pennsylvania.
Whiteley, Edward Albert,	<i>Rhubarb,</i>	Pennsylvania.
Whitely, John Campbell,	<i>Incompatibility,</i>	Ontario.
Whittem, William Henry,	<i>Glycyrrhiza glabra,</i>	Pennsylvania.
Wilson, John Swain,	<i>Precipitates of sanguinaria,</i>	Pennsylvania.
Winch, Howard George,	<i>Elixir cinchonæ,</i>	Pennsylvania.
Winger, David Zwingle,	<i>Menthol,</i>	Maryland.
Wolfe, Wm. Holmes,	<i>Basham's mixture of U.S.P.,</i>	Maryland.
Woods, Samuel Ross,	<i>Pharmaceutical education,</i>	Ontario.
Woolley, Washington Irving,	<i>Structure of convallaria,</i>	New Jersey.
Wyatt, John Congle,	<i>Assay of sanguinaria,</i>	Oregon.
Yaple, Florence,	<i>Twelve commercial cocoas,</i>	Ohio.
Yeakle, Samuel Newton,	<i>Eucalyptus globulus,</i>	New Jersey.
Young, George E.,	<i>Problems for the pharmacist,</i>	Pennsylvania.
Young, Warren Ray,	<i>Ipecacuanha,</i>	Pennsylvania.
Zook, John Noah,	<i>Syrup of hydriodic acid,</i>	Pennsylvania.

STATES AND COUNTRIES REPRESENTED BY THE GRADUATING CLASS.

Arkansas	1	Mississippi	1	Oregon	4
California	1	Missouri	1	Pennsylvania	125
Delaware	5	Nebraska	1	Syria	1
Ecuador	1	Nevada	1	Tennessee	2
Georgia	3	New Jersey	11	Texas	3
Germany	1	New York	4	Utah	1
Illinois	1	North Carolina	1	Vermont	1
Indiana	2	Nova Scotia	3	Virginia	1
Kansas	1	Ohio	11	Washington	1
Maine	1	Ontario	2	West Virginia	1
Maryland	4				

Special certificates for a two years' course in general applied and analytical chemistry were awarded to :

H. Blount Hunter, North Carolina.
Theodore Littlefield Gamble, Pennsylvania.
William Edward Ridenour, Ohio.
Houston Talbot Thayer, Tennessee.

The following members of the graduating class received the grade of

DISTINGUISHED.

David L. Greenawalt, Percy Hyers, C. Otto Moosbrugger, William L. Peabody, William F. Ridgway.

MERITORIOUS.

Andrew Campbell, Warren W. Flitcraft, Robert M. Jackson, Scott W. Lau, Benjamin C. Quick, Nathan L. Thompson, Robert G. Davis, Walter S. Hamilton, Harry H. Kline, Max Morris, Frederick W. Ritter, Thomas R. Thornton.

The *Materia Medica* Prize of a microscope, offered by the family of the late Professor Maisch, for original histological work on American plants, was awarded to Frederick W. Ritter, and the following graduates received honorable mention in connection therewith: Edwin A. Hering, Horace B. Heysham.

The Pharmacy Prize, a gold medal, offered by Professor J. P. Remington for original pharmaceutical work, was awarded to Annie R. Stephen.

The Chemistry Prize of an analytical balance, offered by Professor S. P. Sadtler for original chemical work, was awarded to William E. Ridenour, with honorable mention of William L. Peabody and James W. Nickum. The American Journal of Pharmacy Prize of \$25, offered by Professor H. Trimble for original chemical work, was awarded to William E. Ridenour.

The John M. Maisch Prize of \$20 in gold, offered by Mr. J. H. Redsecker, of Lebanon, Pa., for histological knowledge of drugs, was awarded to Robert M. Jackson, with honorable mention of Frederick W. Ritter, Warren R. Young, Scott W. Lau.

The Operative Pharmacy Prize of \$25 in gold, for the best examination in that branch, was awarded to William F. Ridgway, and the following received honorable mention in connection therewith: Frederick Brunhouse, Jr., Henry S. Conrey, William R. Davies, David Ellis, Warren W. Flitcraft, William L. Peabody, John K. Webb, Samuel R. Woods, Washington I. Woolley.

The Theoretical Pharmacy Prize of a balance, offered by Mr. Henry J. Maris for the best examination in that branch, was awarded to David L. Greenawalt, with honorable mention of C. Otto Moosbrugger, Warren W. Flitcraft, Harry B. Foresman, Walter S. Hamilton, Percy Hyers, Robert M. Jackson, Scott W. Lau, Emanuel H. Lauer, Max Morris, William L. Peabody, William F. Ridgway, Frederick W. Ritter, Nathan L. Thompson, Julius H. Ulrich.

The Robinson Prize, a gold medal and certificate, offered by Mr. J. S. Robinson, of Memphis, Tenn., for the best examination in general and analytical chemistry, was awarded to Thomas R. Thornton, with honorable mention of Percy Hyers, C. Otto Moosbrugger, James W. Nickum, William L. Peabody, Nathan L. Thompson, George E. Young.

The valedictory address to the graduating class was delivered by Professor Henry Trimble.

The farewell supper, given by the professors to the graduating class, was held in the Museum of the College, on Tuesday evening, April 16th. The officers and trustees of the College were present, along with some other invited guests. After the menu was disposed of, speeches were made by the faculty, some of the trustees and members of the class.

ALUMNI ASSOCIATION OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The thirty-first annual meeting of the Alumni Association of the Philadelphia College of Pharmacy was held at the College Building, Tenth Street, above Cherry, on Monday afternoon, April 15th.

President William Lincoln Cliffe, Ph.G., presided, and read his annual address, in which he said: "The end of this year begins another era in the history of the Association. Along with the inauguration of three terms of instruction, the Board of Trustees has found it necessary, owing to changes in the curricu-

lum, to place the management of the quizzes directly under its own control, thus abolishing the interest, both financially and supervisory, which the Association has heretofore enjoyed."

William E. Krewson presented his fifteenth annual report as secretary, in which he reviewed the work of the Association during the past year.

"The college review quizzes were quite successful this year," he stated, "221 of the juniors subscribing. The senior quiz class numbered 168 full tickets; 19 did not come up for examination; 188 took first modified examination, and 17 failed to pass the examination; 134 passed successfully; of the latter number 106 will be members of the Class of 1895, and the other 26 are deferred on account of being under 21 years of age, or because they have had less than four years' experience in the drug business, and will be assigned to future graduating classes. During the past year 25 members of former quiz classes who passed the examinations in previous years so successfully, and were deferred, have been duly elected by the Board of Trustees as graduates in pharmacy, and are assigned to the Class of 1895, which will make a total of 169 new members from the Class of 1895. This makes a total of 177 new members added during the past year. The total membership of the association is 2,514; total receipts during the past year, \$7,370.57; expenditures, \$6,543.75; balance in the treasury, \$826.22."

The report of the Memorial Committee showed that 20 members had died during the past year, and the deaths of 5 others not before reported were also announced.

The following officers were elected for the ensuing year:

President, Jacob S. Beetem, '78; First Vice-President, Dr. J. Louis D. Morison, '88; Second Vice-President, Jos. Crawford, '84; Treasurer, Edward C. Jones, '64; Secretary, Wm. E. Krewson, '69; Corresponding Secretary, James C. Perry, '91; Trustee of Sinking Fund, Thos. S. Wiegand, '44. Executive Board, elected for three years: William Lincoln Cliffe, '84; Joseph W. England, '83; Rush P. Marshall, '81; F. W. E. Stedem, '82. Dr. Henry A. Newbold, '70, was elected for two years to fill the unexpired term of Charles B. Hunterson, deceased.

There is a strong sentiment among the members of the Alumni Association favoring the establishment of a gymnasium for the students. The matter of securing a room in the College building for the students for social uses, and the question of publishing a historical compendium of the graduates, were referred to a special committee.

RECEPTION TO THE GRADUATES.

The thirty-first annual reception of the Association to the seventy-fourth graduating class, which was held on the evening of April 15th, at the Hall of the Young Men's Christian Association, Fifteenth and Chestnut Streets, was a very pleasant event.

An interesting concert programme was played by Bastert's Orchestra; President Cliffe made the introductory address; Francis P. Kelly, of Carbondale, Pa., delivered the annual class oration; Brenton S. Lancaster, of Forksville, Pa., recited a poem dedicated to the graduating class; Robert H. Tarr, of Cleveland, O., gave the history of the class of '95, and Charles Wilson Stern, of Smyrna, Del., foretold the future of the class.

Alumni Association gold medal and prize certificates for 1895 awarded to the best student in each branch: Alumni gold medal, William Legoria Peabody, St. Louis, Mo.; pharmacy, David Lehman Greenawalt, Chambersburg, Pa.; chemistry, Percy Hyers, Dayton, Ohio; materia medica, Robert MacGregor Jackson, New Glasgow, N. S.; pharmacognosy, Scott Wolford Lau, Dillsburg, Pa.; general pharmacy, Andrew Campbell, Williamsport, Pa.; operative pharmacy, Wm. Frederick Ridgway, Seattle, Wash.; analytical chemistry, William Van Korb, Amsterdam, N. Y.; microscopical botany, Frederick Wm. Ritter, Middleport, Pa.; prize certificate for best collection of indigenous plants, Clinton Llewellyn Shoemaker, Allentown, Pa.; prize certificate to best junior student, Louis Peter Carstens, Davenport, Ia.

OBITUARY.

EDMOND PRESTON, JR., PH.G.

Edmond Preston, Jr., Ph.G., Class of 1884, was born at Fallston, Hartford County, Md., December 6, 1862, and died at his late residence, N. E. corner Broad and Ellsworth Streets, on Tuesday, December 18, 1894, aged 30 years and 18 days. He was the youngest son of Edmond and Phœbe H. Preston, who were members of the Society of Friends. He received his education at his native place and attended the school of Geo. G. Curtis, who was a Harvard graduate. At the age of 17 he entered the drug store of Wm. Proctor, Jr., & Co., at Ninth and Lombard Streets, Philadelphia, as an apprentice and learned the drug business with that firm, serving faithfully for four years. He matriculated at the College October, 1880, and passed a successful examination in the following spring. In the fall of 1882 he entered the senior class, and after taking two senior courses, he graduated with honor in March, 1884, his thesis being entitled "*Phytollacca Radix*." After his graduation he entered the employ of Howard G. Shinn, Ph.G., corner Fifteenth and Master Streets, remaining for one year, and afterwards he went with Lancaster Thomas, at Nineteenth and Pine Streets, remaining for a few months, when he was transferred to the store Broad and Ellsworth Streets, and was shortly afterwards promoted to the position of chief clerk, remaining until 1890, when he purchased the business from Mr. Thomas, and remained in this location until his death. He was married October 3, 1888, to Lena M. Griest, of Hartford County, Md., who survives him, together with three children. He was an honorable and active business man and an honor to his profession.

His funeral services were largely attended by his fellow-druggists, on Wednesday afternoon, December 19, 1894, and his remains were interred the following day at his native place, Fallston, Md.

W. E. K.

THE AMERICAN JOURNAL OF PHARMACY

JUNE, 1895.

AN EXAMINATION OF COMMERCIAL FLUID EXTRACTS.

BY FREDERICK W. HAUSSMANN.

Every pharmacist who has handled fluid extracts obtained from different manufacturers, must have noticed the variation in their physical properties, as pertaining to color, odor and taste, and also as shown in their miscibility with water or other liquids.

These variations, which were in a number of instances of a striking nature, induced the writer to make a series of examinations, not primarily regarding their chemical composition, such as the alkaloidal percentage, but more particularly the menstruum, as compared with that required by the Pharmacopœia, and also to determine the causes which led to the differences mentioned in their physical properties.

The first feature to which our attention is called, lies in the various shades of color which are frequently observed in fluid extracts prepared from the same drug.

Due to the high degree of heat at which some fluid extracts are evaporated, variations in odor and taste are also noticeable at times. Extracts whose properties are due to volatile principles, such as buchu, cubeb, eucalyptus, etc., are liable to be affected in this manner.

The physical condition of fluid extracts, as regards their fluidity, varies considerably, and in this respect, as probably in no other, the preparations of some manufacturers are characterized.

Some we find of a decidedly syrupy consistence, especially those with a low alcohol percentage, while others are more approximate to the pharmacopœial products. These variations may be partly due to differences in the physical properties of crude drugs, but in many

cases also to the tendency of some manufacturers to economize that most important menstruum constituent, *alcohol*. Unfortunately, specific gravity is no criterion of the alcohol percentage of fluid extracts.

It is true, that an extract of a high specific gravity, for which the Pharmacopœia directs a largely alcoholic menstruum, must be regarded with suspicion, but it does not furnish the means to determine the alcohol percentage of the employed menstruum with any degree of accuracy.

While handling a number of commercial fluid extracts, the high specific gravity of some, contrary to his experience with the same official fluid extracts, induced the writer to determine their alcohol percentage.

Taking the menstrua of the Pharmacopœia as the standard authority, with which the manufacturer, as well as the pharmacist, should comply, comparisons were made between the alcohol percentage found and that required. The extracts examined were taken at random from the preparations of different firms, and regarded as representing the respective average percentage of their preparations. The following table gives the results obtained :

Fluid Extract.	Sp. Gr.	Pharmacopœial Menstruum in Alcohol Per- centage by Vol- ume of Official.	Alcohol Percentage Found.	
			Weight.	Volume.
Buchu	·885	Alcohol.	76	82
Buchu	·956	"	56	64
Cimicifuga	·873	"	76	82
Cubeb	·882	"	73	80
Rhubarb	1·0095	80	55	63
Serpentaria	·9255	80	61	69
Calumba	1·042	75	34	41
Senega	1·0085	75	43	51
Chirata	·989	66	38	45
Digitalis	1·008	"	43	50
Phytolacca Root.	·9855	"	51	59
Hydrastis	1·080	60	26	31
Gentian	1·0985	50	27	32
Rhamnus Pursh.	1·052	"	12	15
Senna	1·080	"	25	31
Stillingia	·9855	"	36	43
Taraxacum	1·103	"	12	15
Glycyrrhiza	1·0395	30	23	28
Sarsaparilla Comp.	1·0465	"	6	7
Triticum	1·1296	25	17	21
Prunus Virginiana	1·1025	—	30	36

In the last-mentioned extract, the exact alcoholic percentage of the menstruum cannot be stated, as the Pharmacopœia directs the drug to be macerated with a mixture of water and glycerin, to be followed by percolation with a mixture of 85 parts alcohol and 15 parts water.

The largest percentage of alcohol in fluid extracts, whose menstruum consists entirely of that liquid, was found in F. E. *Cimicifuga*, the smallest in F. E. *Buchu*.

The two samples examined of the latter were from different manufacturers, and a glance upon the table will reveal a decided difference in their respective alcohol percentages. Fluid extracts for which the Pharmacopœia directs a menstruum of 2 parts of alcohol to 1 of water, contained a comparatively larger alcohol percentage than those for which the same authority requests an alcoholic menstruum of 3 parts of alcohol to 1 part of water. F. E. of *Calumba*, which belongs to the latter class, was found to contain only 34 per cent. of absolute alcohol, while F. E. *Phytolacca*, representing the former, contained 51 per cent.

A small alcoholic percentage was also found in a syrupy F. E. *Hydrastis*.

Remarkable variations were found in fluid extracts with a supposed-to-be diluted alcohol menstruum. The largest percentage found was in F. E. *Stillingia*, 36 per cent., which is closely approximate to the pharmacopœial requirement.

F. E. *Cascara Sagrada* and *Taraxacum* contained only 12 per cent. of alcohol, by weight.

Compound F. E. *Sarsaparilla*, with a menstruum of 30 per cent. of alcohol, was found to contain 6 per cent., by weight, while F. E. *Glycyrrhiza*, with the same alcoholic menstruum percentage, contained 23 per cent.

GLUCOSE IN FLUID EXTRACTS.

The syrupy condition of some commercial fluid extracts, and the sweet taste, occasionally observed in preparations from bitter or acrid drugs, induced the writer to determine the percentage of glucose, or, what is perhaps a more correct statement, an allied substance, which likewise has the property of giving the various glucose reactions.

In addition to this, the negative result experienced in some instances, where the preparations were made from drugs, which are

not stated to have an appreciable saccharine percentage, or whose sugar, if present, is stated not to possess the power of reducing Fehling's solution, was also the basis for these examinations.

Such was, for instance, found to be the case with several samples of F. E. Gentian, which showed by repeated examination the presence of 5 per cent. of a substance corresponding to glucose in every respect.

According to published authorities, gentianose, the sugar present in gentian root, does not reduce Fehling's solution. This has not been the writer's experience, either in the commercial fluid extract or in a sample which was prepared strictly according to the pharmacopœial directions. The remarkably high sugar percentage of some fluid extracts prepared from ranunculaceous plant drugs, which, on comparison with similar official fluid extracts, showed a vast difference, was likewise another reason for this investigation.

Glucose is a normal constituent of many plants, also lævulose, or fruit sugar, which possesses likewise the property of reducing Fehling's solution.

In the process of preparation of galenical preparations, it may also be produced by the decomposition of other compounds, such as inulin, tritacin, particularly in the presence of heat. These may be regarded as being some of the natural sources of the sugar which is liable to be present in fluid extracts. Again, excessive heat in their evaporation will have the effect of caramelizing some of the constituents, which, however, by careful observation of pharmacopœial directions, is obviated. Besides this, the claim is made, that caramel is frequently added by manufacturers of fluid extracts on a large scale, for the purpose of coloring their preparations.

The fallacious popular idea that darkness in color is an indication of strength and a criterion of quality is unfortunately also accepted by a number of pharmacists.

Caramel also has the property of reducing Fehling's solution, and forms, in some fluid extracts, when examined for glucose, an important factor.

Glucose cannot be detected with certainty directly in fluid extracts, or liquids containing other vegetable matter. These compounds, as, for instance, tannin, have also the property of reducing Fehling's solution, and must, therefore, first be removed.

The process recommended in Dragendorff's Plant Analysis, precipitation with basic lead acetate, and subsequent treatment with sulphuric acid, was employed.

Ten c.c. of the fluid extract under examination was diluted with water to 20 c.c.

In most cases the mixture became cloudy, and filtration, until a clear liquid was obtained, was necessary.

The mixture was then precipitated with basic lead acetate solution, filtered from the precipitate and the excess of lead in the filtrate carefully precipitated by diluted sulphuric acid.

The liquid, by means of washing the precipitate with water, was made up to the original volume of 20 c.c.

As a rule the effect of picric acid test solution upon the liquid representing 50 per cent. of the fluid extract, was first noted, and also a superficial examination for glucose made by means of the picric acid and potash method of Braun with the intention of determining the necessary degree of dilution before making the volumetric examination with Fehling's solution.

A few statements must be made regarding fluid extracts in general, before quoting the results obtained. In samples containing caramel, if the same is present in considerable amount, the filtrate, after the lead and acid treatment, is of a brown color.

Caramel is not precipitated by basic lead acetate, and through this fact evidence of its presence was shown in a number of fluid extracts.

For instance, in a sample of *F. E. Taraxacum*, prepared by the writer according to the Pharmacopœia, the final filtrate, after this treatment, was almost colorless, while in several commercial specimens, similarly treated, the same was decidedly brown. A like observation was also made with *F. E. Gentian* and several others.

The preparations examined by the writer comprised the products of eight different manufacturing firms, the samples all being selected at random, preferring, however, those official, wherever obtainable.

The amount of glucose, or, perhaps, more appropriately, the substance which reduces Fehling's solution and gives reactions with other glucose reagents, varied considerably, some extracts showing a high percentage, while others only contained scarcely appreciable traces. Due to lack of time, the percentage was not ascertained in some, while in a number several determinations were made.

The following were the figures obtained :

(1) Twenty samples were examined of this firm, and they are arranged according to the amount of glucose found.

Five per cent. and over. F. E. Taraxacum, Triticum, Gentian and Cimicifuga.

Four per cent. F. E. Cascara Sagrada. 3.5 per cent. F. E. Rheum. 2.5 per cent. Buchu, Prunus Virginiana, Senna, Hydrastis, Asclepias.

One per cent. Grindelia Robusta, .833 per cent. Humulus and Digitalis, .5 per cent. Ipecacuanha.

F. E. Belladonna leaves, Calumba and Nux Vomica, also contained sugar in small amount, but no quantitative estimation was made.

F. E. Coca contained less than 0.5 per cent.

F. E. Cubeb, which was also examined, was found perfectly free from all saccharine matter.

(2) From this source 8 samples were examined, quantitative determinations being made in each case.

The largest percentage found was 5 per cent. in F. E. Pulsatilla ; 3.5 per cent. was found in Cypripedium ; 3 per cent. in Buchu ; 2.5 per cent. each in Frangula, Ipecacuanha and Pilocarpus ; .5 per cent. in Rhus Glabra, while the smallest amount found was in F. E. Damiana, namely, .35 per cent.

(3) Five extracts were examined from this source.

The average glucose percentage of these preparations was small, the largest amount being found in F. E. Stillingia, which contained 1.66 per cent., the smallest in F. E. Aconite Root, which only gave indication to the extent of .1 per cent.

F. E. Dulcamara contained about 1.5 per cent.; Belladonna root, 1.25 per cent. ; and Eucalyptus, .625 per cent.

(4) This source furnished 5 samples.

The largest amount was found in F. E. of Phytolacca, the fruit, which was over 7 per cent.

This is, however, no criterion, as the drug contains considerable fruit sugar.

F. E. Granati Rad. Cortex gave indication of .67 per cent.; Euphorbia pilulifera, .5 per cent.

F. E. Pichi and Quebracho were also examined, and revealed but small amounts, so that a quantitative estimation was not made.

(5) Four samples were examined from this source. The largest percentage was found in F. E. Bryonia, 1.668, per cent., in Hydrangea .712, while in F. E. Xanthoxylum and Lippia Mexicana the exact amount was not ascertained.

(6) Three samples were procured from this source. The largest percentage was found in F. E. Convallaria, which was 2.5 per cent.; F. E. Stigmata Maydis contained 1 per cent., while F. E. Belladonna Leaves showed 5 per cent.

(7) Two samples were obtained from this firm. The largest amount of glucose was found in F. E. Burdock Root, which was 5 per cent. F. E. Pimpinella contained 1.67 per cent.

(8) The two samples from this source were F. E. Coca and Humulus.

The hop fluid extract contained the largest amount, 2 per cent.; the other contained 1 per cent.

A few remarks may perhaps be not inappropriate regarding these determinations.

The remarkably high glucose percentage in some of the representatives of the Ranunculaceae, 5 per cent. each in F. E. Cimicifuga and Pulsatilla, obtained, by the way, from different manufacturers, induced the writer to determine the amount of glucose in F. E. Cimicifuga, prepared by himself.

While traces of glucose were present, determinations by Fehling's solution showed the presence of less than 1 per cent.

The small amount present was also indicated by the fact that Braun's or Boettger's bismuth test, when applied, responded but feebly.

This is remarkable, as the commercial extract examined bore but little evidence of the presence of caramel. (In the pulsatilla sample, the presence of the latter was, however, very evident.)

To determine whether the process of evaporation of the final percolate produced any material change in the glucose percentage found, examination was made respectively before and after the evaporated extract was incorporated with the reserved portion, but no material difference was revealed.

Similar determinations were made with fluid extracts of gentian and rhubarb, with a like result.

Evaporation at the temperature directed by the Pharmacopœia does not appear to produce any material change—in particular, no appreciable increase of the glucose percentage.

Comparison was also made between fluid extracts, prepared from the same drug and obtained from different manufacturers.

As already stated, considerable variation in color is frequently observable, and this is in many instances due to the presence of caramel.

Regarding their glucose percentage, some variation also exists.

In a sample of F. E. Buchu, the percentage of one sample was 2.5; of another, 3 per cent. The filtrate of the former, after the lead and acid treatment, was almost colorless; of the latter, a decided brown.

In F. E. Belladonna leaves the glucose percentage of one sample was .5 per cent.; of another, less than .2 per cent. Incidentally may be noticed, that the narcotic fluid extracts in general appear to contain but little sugar.

This was observed in F. E. Belladonna leaves, hyoscyamus and also in digitalis.

F. E. Coca leaves, of a deep black color, obtained from one firm, showed a glucose percentage of 1, while the dark green preparation of another firm showed less than .5 per cent.

F. E. Humulus, from one firm, strongly alcoholic, precipitating resin on dilution with water, gave indication of about .830 per cent. of glucose, while the dark brown miscible extract from another source indicated 2 per cent.

F. E. Ipecacuanha showed in one instance a percentage of .5; in another, 2.5 per cent.

Other comparisons were also made, but the above may illustrate the claim that commercial fluid extracts, as a rule, are not alike in physical properties and composition as obtained from different manufacturers.

Interesting revelations are made in some fluid extracts after subjecting them to the lead and acid treatment mentioned.

If to the final filtrate picric acid test solution is added, alkaloids, if present in the drug, will be indicated.

Among those affected in this manner may be mentioned F. E. Coca, Ipecac, Hydrastis, Quebracho, Cimicifuga, Xanthoxylum, Calumba, and a number of others.

Fluorescent compounds were revealed in the filtrates from F. E. Pichi and Hydrangea, the fluorescence in each being increased by the addition of an alkali.

Comparison was also made between commercial fluid extracts and some prepared from the same drug according to pharmacopœial directions.

F. E. Cimicifuga has already received mention.

F. E. Gentian readily reduces Fehling's solution, both in the official and commercial preparations.

The samples of the commercial extracts examined, however, showed a glucose percentage of over 5 per cent., while the official preparation was found to contain 2.5 per cent. A like result was also found in F. E. Taraxacum.

This preparation, when made according to the Pharmacopœia, contained between 2 and 3 per cent. of glucose, while two samples of the commercial fluid extract, showed between 5 and 6 per cent. to be present. The presence of caramel was, however, noticeable in both.

A sample of commercial F. E. Calumba gave ready indication of the presence of glucose, while the preparation made from the drug by the writer was found to be perfectly free from the same. All the available tests for glucose gave a negative indication of its presence.

F. E. Rhubarb, prepared by the writer, was found to contain about 1 per cent. of glucose.

Two commercial samples were found to contain respectively 3 and 4 per cent

A number of similar comparisons were also made, furnishing, in the main, like results.

Incidentally it may also be mentioned that, while making the above examinations, the presence of possible metallic contamination was also inquired into. In a number of commercial samples the presence of copper was easily detected, showing that but little discrimination was used in the selection of the working utensils.

The importance of self-manufacture in this class of preparations cannot be too strongly urged upon the pharmacist, if it is his desire to comply strictly with the Pharmacopœia.

While it is impossible for him to do so in every instance, there is no reason why he should not manufacture those frequently used, and in whose reliability he can have absolute confidence.

In commercial fluid extracts his only authority is the manufacturer's statement upon the label.

THE TANNIN OF CLOVES—

BY WM. L. PEABODY, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 140.

The United States Dispensatory (17th edition, page 331) states that Trommsdorff found 18 per cent. of tannin in cloves. The National Dispensatory (5th edition, page 417) states that the same investigator obtained 13 per cent. of tannin, and adds, in parentheses, "which has not been further investigated."

Whether this parenthetical clause is an expression of doubt as to the occurrence of the principle in such quantity, or is intended by the editors of that authority to direct attention to the nature of the tannin of this aromatic drug, the writer is not assured. So, in order to further investigate this matter, he procured and estimated samples of powdered cloves from the cities named in the tabulated results, and subsequently isolated the tannin from an authentic specimen with the intention of classifying it.

The estimations were made upon decoctions prepared by completely exhausting twenty grammes of the powdered air-dry sample with hot water; when the liquid had cooled it was mixed with enough water to make one litre and then filtered.

Upon trial the method of estimation which involves the precipitation of the tannin by gelatin in the presence of alum was found to be ill-adapted for application to cloves, for the reason that the precipitated matter clogged the filter upon which it was to be collected, to such an extent that it was feared decomposition would take place before the filtration of the mixture and the washing of the precipitate could be accomplished. This process having been abandoned, the plan of estimation tried next was that known as the "Hide-powder Method," and, as no difficulty was experienced in the use of it, this method was accordingly employed on all of the samples.

The application of the process consisted in siphoning some of the decoction through previously rasped raw hide contained in a small glass percolator, which was made to serve as the short arm of the siphon, it having been inverted in a vessel containing the decoction. A rubber tube attached to the neck of the percolator so arranged, and leading into a graduated cylinder, constituted the long arm of the apparatus.

After allowing sufficient time for the liquid to thoroughly penetrate the hide, the flow of the siphon was started by gentle suction applied to the long arm. The hide retained the tannin and coloring matter, but allowed the other constituents of the decoction to pass through in solution.

The first 30 c.c. of the liquid obtained in this manner were considered as containing the soluble matter of the hide, and were therefore rejected. The succeeding 50 c.c. that were received from the siphon were evaporated to a constant weight on a water-bath to ascertain the amount of solids unabsorbed by the hide. 50 c.c. of the original decoction were likewise evaporated to a constant weight to determine the total solids present. The difference between the weights of the solids in these equal volumes was taken as the amount of tannin absorbed by the hide, and from this quantity the percentage was calculated by simple proportion to the weight of air-dry cloves represented by this volume of decoction.

The following results were obtained :

Sample No.	Where Obtained.	Percentage of Tannin.
1	St. Louis	10.50
2	Philadelphia	11.60
3	Philadelphia	12.65
4	New York	10.03
5	Philadelphia	12.00
6	St. Louis	13.35
7	St. Louis	5.50

The samples, with the exception of No. 7, were obtained from the better wholesale and retail stores. No. 7 was purposely bought from the very cheapest trade in order to estimate the tannin in an adulterated article.

Based upon the difference in percentage of tannin found, an estimation of that principle might be of some service in deciding whether a sample of cloves was of good quality.

ISOLATION AND PURIFICATION.

To extract the tannin in order that an investigation of its chemical characters might be made, a quantity of powdered cloves of good quality was exhausted by percolation with acetone. The solvent was recovered from the percolate by distillation, the residual extract thoroughly agitated with water, and the resulting mixture filtered. The filtrate was agitated with acetic ether, which removed some

coloring matter, but no tannin. The aqueous layer from the above operation was saturated with sodium chloride and again shaken with acetic ether. In the presence of the sodium chloride, the coloring matter and almost all of the tannin were readily removed from the aqueous liquid by agitation with three successive portions of acetic ether. These were united and the solvent recovered. The residue so obtained was treated with water, which left considerable wax, oil and resin undissolved. The solution was filtered and the filtrate shaken with acetic ether as before. The acetic ether layer was separated and the solvent recovered. The residue left was treated with water and the filtered solution shaken with acetic ether in the manner described. After several repetitions, this process indicated its value to separate the resinous constituents from the tannin. But a considerable waste of that principle was found to have occurred when the acetone extract was treated with water for the first time. To obviate this loss, which arose through precipitation of the tannin along with the resin, a second method of purification was instituted. This consisted in mixing the acetone percolate of another lot of the same quality of cloves, and from which the solvent had not been recovered, with sufficient water to completely precipitate it. Paper-pulp was uniformly distributed throughout the unfiltered mixture in order to fully clarify the aqueous solution. This treatment proved successful; the pulp retained the oil, wax and resin so effectually that a clear liquid was obtained by simple filtration. Some acetone was added to this liquid to replace that lost by evaporation, and the entire solution afterwards saturated with sodium chloride. The last substance caused the acetone to separate as a supernatant layer. When this was removed and the solvent recovered, a considerable quantity of tannin was obtained. Further agitation with two successive portions of acetone sufficed to exhaust the aqueous layer of tannin.

The product obtained upon the recovery of the acetone was equal in purity to that in hand when the process of repetition at first employed was discontinued, while the attendant waste of tannin was very much less.

From both the first and second methods of isolation, the tannin, upon the recovery of acetic ether or acetone, was obtained in a porous or "puffed-up" condition. The products of both processes were dissolved in the same portion of water, the solution treated

with paper-pulp, the resulting mixture filtered, and the clear filtrate shaken repeatedly with ether to remove the last traces of oil and resin. From the aqueous layer, after the separation of the last portion of ether, the tannin was removed by the addition of acetone and subsequent saturation of the liquid with sodium chloride. The acetone layer, which was thus separated, was removed, and the solvent recovered. The residue was dissolved in water, the solution filtered, and the filtrate agitated with ether. The ether layer was separated and the aqueous layer distilled under reduced pressure to dryness. The resulting tannin was of a straw-yellow color. To render it more porous, the tannin was dissolved in a mixture of absolute alcohol and ether, and these solvents rapidly vaporized under greatly diminished pressure.

CLASSIFICATION.

The tannin, isolated and purified by the process already described, was submitted to a series of experiments, by means of which its chemical behaviors and composition might be ascertained and its classification therefrom decided.

Reactions.—The following reactions were obtained from a one per cent. solution of the tannin in water. For comparison, the reactions afforded by gallotannic acid and white-oak bark tannin—representatives of the two classes of tannins now recognized—are placed beside those given by the tannin of cloves:

Reagent.	Tannin of Cloves.	Gallotannic acid.	White Oak Bark Tannin.
Bromine water	No ppt.	No ppt.	Yellow ppt.
Ferric chloride	Bluish-green ppt.	Blue color and ppt.	Green color and ppt.
Lead nitrate	Light yellow ppt.	White ppt.	
Cobalt acetate	Brownish ppt.	Purple ppt.	
Manganese acetate . . .	Yellowish ppt.	White ppt.	
Uranium acetate	Dark brown ppt.	Brown ppt.	
Copper sulphate and Ammonium hydrate } . . .	Slight ppt.	No ppt.	
Sodium sulphite	Dark brown ppt.	Brown ppt.	
Ammonio-ferric sulphate } . . .	Yellowish-pink color	{ Very slight pink color.	{ Yellow color with streaks of pink.
Calcium hydrate	Bluish-green ppt.	Blue color and ppt.	Green color and ppt.
Pine shaving with hydrochloric acid } . . .	{ No red color, on long standing turning green.	Ppt. turning blue.	Ppt. turning pink.
Stannous chloride and hydrochloric acid } . . .	No violet color.	Slight green color.	Violet color.
	No change in color.	No change in color.	Pinkish color.

It will be seen that the preceding reactions point to a similarity of the tannin of cloves to that of galls rather than to the tannin of white oak bark.

Action of Heat.—0.5 gramme of the tannin were heated with a few cubic centimetres of glycerin to 150° C., for twenty minutes. The heat was then gradually raised to 190° C., at which temperature it was maintained for a short time. The resulting mixture was allowed to cool. It was then shaken with several portions of ether, which removed, and, upon evaporation, left a crystalline substance. This was dissolved in water. The aqueous solution reacted as follows:

Calcium hydrate, red color; becoming a precipitate.

Ferric chloride, green or brownish-green color.

Ferric acetate, green or brownish-green color.

Ferrous sulphate, no change.

Action of Acids.—Two grammes of the tannin were added to 100 c.c. of 2 per cent. (absolute gas) hydrochloric acid. The liquid was heated to boiling, whereby a large part of the tannin was dissolved in a few minutes with the production of a reddish-brown solution. When the liquid had been boiling for an hour all of the tannin had entered solution. After the lapse of three hours the boiling solution had separated a dirty substance, but no red precipitate of phlobaphene character. The liquid was then allowed to cool, the insoluble substance filtered out and the filtrate shaken several times with ether. The mixed ethereal solutions when allowed to evaporate left a crystalline substance, whose water solution reacted in a way to indicate gallic acid, as follows:

Potassium cyanide, red color that faded, but, upon agitation, was restored.

Potassium hydrate, green color.

Ferric chloride, blue color, turning to green.

Ferrous sulphate, violet color, turning to brown, in neutral solution.

Ammoniacal silver nitrate, reduced.

Fehling's solution, reduced.

Lead oxyacetate, precipitate.

Lead acetate, precipitate, filtrate not pptd. by lead oxyacetate.

Pine shaving and HCl, no violet or red color.

The dirty substance that separated while the liquid was boiling was treated with hot alcohol, in which it was almost entirely soluble. The solution so obtained was set aside to allow the alcohol

to evaporate spontaneously. The residue left upon evaporation was dissolved in water and the solution tested with these reagents:

Calcium hydrate, brown color.

Ferric chloride, blue color, changing to green precipitate.

Ferric acetate, greenish-black color.

Ferrous sulphate, blue color; slight precipitate.

Action of Fused Alkali.—0.5 gramme of tannin were gradually added to potassium hydrate in the state of fusion. When first brought into contact with the alkali, the tannin swelled into a white, spongy mass, but, upon stirring, it readily mixed with the fused alkali and produced a brown solution. During this treatment, which was conducted for twenty minutes, an odor similar to that noticed in soap-making was emitted.

The products of the fusion were allowed to cool, and afterwards dissolved in water. The solution was neutralized with dilute sulphuric acid, and shaken several times with successive portions of ether. The ethereal layers were mixed and the bulk of solvent recovered by distillation. The last portion was allowed to evaporate spontaneously. It left a residue, the water solution of which gave the following reactions:

Potassium cyanide, red color, fading, but upon agitation was restored.

Potassium hydrate, red color.

Ferric chloride, blue color, changing to green precipitate.

Ferrous sulphate, violet color.

Ammoniacal silver nitrate, reduced.

Fehling's solution, reduced.

Lead oxyacetate, precipitate.

Lead acetate, precipitate, filtrate giving white ppt. with lead oxyacetate.

Pine shaving and HCl, no violet or red color.

Acetyl Derivative.—0.250 gramme of the tannin were boiled with acetic anhydride for an hour. The resulting solution was then poured into water, which caused the precipitation of a gummy mass that became hard and brittle upon standing in contact with the water. This mass had a brown color. When dried and powdered it was found to have a melting point of 145° C.

Ultimate Analysis.—While the reactions afforded by the products of the several treatments to which the tannin was subjected were in no case distinctly indicative of any of the four substances to be expected from the decomposition of the two classes of tannin, still they point to pyrogallol and gallic acid—products of the decomposition

of gallotannic acid—rather than to catechol and protocatechuic acid, which are derived in like manner from oak bark tannin. The partial vitiation of those reactions was undoubtedly due to the inability of the process of purification to separate every trace of the oil and resin which were associated so tenaciously with the tannin. In order, therefore, to conclusively decide to which class the tannin of cloves belongs, two combustions were made of a quantity of the principle that had been dried at 120° C.

The centesimal composition of gallotannic acid and of white oak bark tannin are supplied for comparison with the results of these elementary analyses:

	Tannin of Cloves.			Gallotannic Acid.	White Oak Bark Tannin.
	I.	II.	Average.		
Carbon	52'95	51'80	52'37	52'10	59'95
Hydrogen	3'71	3'66	3'69	3'52	5'04
Oxygen	43'34	44'54	43'94	44'38	35'01
	<hr/> 100'00	<hr/> 100'00	<hr/> 100'00	<hr/> 100'00	<hr/> 100'00

The results of these investigations may, therefore, be expressed in the following recapitulatory statements:

(I) The amount of tannin present in cloves ranges from 10 to 13 per cent. of the weight of the spice as found in the market.

(II) The tannin of cloves has the same percentage composition as gallotannic acid, and yields the same decomposition products as does that compound; hence, they are identical.

ANATOLIAN LICORICE ROOT.

BY JAMES W. NICKUM, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 141.

That a knowledge of the constituents of this variety of licorice root might be attained, 50 grammes of the air-dry drug in No. 40 powder were submitted to Dragendorff's scheme for proximate analysis. Consequently, the solvents were applied in the order in which their respective extracts are hereafter treated of.

The application of each solvent was repeated until no further action was exercised. The several portions so applied were filtered off and mixed. In the cases of the petroleum ether, ether and absolute alcohol extracts, the bulk of the solvent was recovered by dis-

tillation, after which operation, to estimate their amounts, the entire extracts were transferred to tared beakers and evaporated to constant weights on a water-bath.

The total solids of the water, alkaline water and acidulated water extracts were determined by evaporating an aliquot part of the solution to a constant weight by the means already described. The residue was ignited and the resulting ash deducted from the weight of total solids. The difference was taken as organic solids.

Both in the absolute alcohol and water extracts, glucose was tested for and estimated by making the liquid alkaline with sodium hydrate and then heating with Fehling's solution for twenty minutes on a water-bath. The cuprous oxide was then collected, washed, dried and converted by ignition into cupric oxide. Forty-five per cent. of the weight of the latter was considered to equal the amount of glucose present in the fractional part of the extract under examination. To estimate the sucrose an equal volume of the glucose containing liquid was boiled for one-half hour with a small quantity of hydrochloric acid to convert the former into the latter sugar. After this treatment, the liquid was allowed to cool, and, after having been made alkaline, was treated with Fehling's solution, as in the case of glucose alone. The increase in the amount of cupric oxide obtained upon the ignition of the cuprous oxide, that resulted from this treatment, was attributed to sucrose, the amount of which was calculated as 95 per cent. of the amount of glucose represented by the additional cupric oxide.

To obviate any discrepancy that might arise from the presence of extractive or glycyrrhizin, the water solution, previous to the application of the process for the determination of glucose and sucrose, was completely precipitated with neutral lead acetate. After filtering the mixture, the excess of lead was thrown out with hydrogen sulphide. The resulting lead sulphide was separated by filtration. The filtrate was warmed to expel hydrogen sulphide, then allowed to cool, and afterwards made up to a definite volume. Portions of this were then used for the determinations of the sugars.

The percentages of constituents stated in this paper are adjusted on the air-dry drug.

Petroleum Ether Extract.—Petroleum ether extracted 54 per cent. of the weight of the root. Only a slight loss in weight occurred when this extract was heated to 120° C. Treatment with hot alco-

hol, sp. gr., .820, left some caoutchouc undissolved. The clear, hot alcoholic solution, filtered from the above insoluble substance, became opalescent when allowed to cool, on account of the separation of wax. When it had become thoroughly cold, this opalescent mixture was filtered. The filtrate was evaporated on a water-bath, a residue of fat and wax being thereby obtained. In this residue there was noticed a crystalline principle which will be treated of more fully under a separate heading.

Ether Extract.—This represented 4.07 per cent. of the drug. About one-tenth of the extract was found to be soluble in cold water.

Absolute Alcohol Extract.—The amount of this extract equalled 6.64 per cent. of the drug. Cold water dissolved about one-half of it. The resulting solution had an acid reaction. It gave, with lead acetate, a considerable yellowish precipitate. Glucose was present to the extent of 1.04 per cent. The amount of sucrose found was 1.41 per cent.

A portion of the cold water solution of the alcoholic extract when treated with test solution of ferric chloride, yielded a dark, brownish-red precipitate; the liquid at the same time acquired a very dark red color. This treatment caused the development of a very strong, licorice-like odor. This odor was as decided as is that of the commercial extract of the drug. After obtaining this result other portions of the aqueous solution were tested with different oxidizing agents, that their effect might be observed. The same odor was produced by the addition of potassium permanganate. Mercuric chloride caused the same effect, but not to such a marked degree. As treatment with diluted hydrochloric acid did not develop the odor, it would seemingly not be due to the decomposition of a glucoside by the usual action of acids.

The results of these tests suggest the inquiry whether or not the odor and possibly the sweet taste of licorice, ensue from a process of oxidation that takes place in the plant during life, or upon drying. It is a well-known fact that these properties are restored in old licorice root by exposing it to an ammoniacal atmosphere; and, in the light of the above results, there arises a question as to a possible oxidation by the air in the favorable presence of the alkali.

That part of the absolute alcohol extract, which was insoluble in water, was almost entirely soluble in ammonium hydrate, only a very small quantity of resinous matter having failed to dissolve.

When this ammoniacal solution was acidified with dilute sulphuric acid, a precipitate was obtained, which was dried to a constant weight and thus estimated as glycyrrhizin. It amounted to .48 per cent. of the entire drug.

Water Extract.—Water dissolved 10.34 per cent. of organic solids. A small quantity of albuminous matter was precipitated when some of the unevaporated solution was mixed with four volumes of absolute alcohol, and allowed to stand over night. The extract included 5.2 per cent. of glucose and 2.21 per cent. of sucrose.

Alkaline Water Extract.—This was obtained by treating the residue from the application of water to the drug with a .2 per cent. solution of sodium hydrate in water. This solvent removed 1.14 per cent. of organic solids. A small quantity of albuminous or mucilaginous matter was detected by acidifying a portion of the liquid extract with acetic acid and then adding four volumes of absolute alcohol.

Acidulated Water Extract.—Water containing .1 per cent. of hydrochloric acid extracted .52 per cent. of organic solids, including parabin. Phosphates and oxalates were also dissolved by the acidulated water.

The Crystalline Principle of the Petroleum Ether Extract.—This principle was first noticed when the residue left upon evaporating the alcoholic solution of the petroleum ether extract, and from which most of the wax had been separated by cooling, was viewed with a lens of low magnifying power. It formed numerous minute crystals of peculiar shapes, and was embedded in the fatty and waxy matters of the extract. Some of the crystals were fern-like in shape, some had the outline of the Maltese cross, while others were long, acicular and interlaced.

The residue containing the crystals was treated with distilled water. The water solution was evaporated to dryness on a water-bath. A very small quantity of distinctly crystalline residue was thereby obtained. This residue was again dissolved in water, and the resulting solution shaken with ether. When separated and allowed to evaporate spontaneously this solvent left a small amount of the crystalline substance. To obtain more of the principle a larger quantity of the same variety of licorice root was subjected to the process by which the crystals were at first isolated. A small

amount was again obtained. The crystalline residue obtained upon the evaporation of the water solution had a distinctly acid reaction, and a peculiarly sour or acid-like taste. The residue was treated with absolute alcohol, in which it was soluble. A few drops of the alcoholic solution were placed on a clean watch crystal, and allowed to evaporate spontaneously.

The watch crystal was examined with the compound microscope, by the aid of which the fern-shaped crystals already described were rendered very distinct. Another portion of the crystalline residue was treated with a small amount of distilled water. A few drops of this solution were transferred to a clean watch crystal, and there allowed to evaporate. Upon examining the residue left in this case with the compound microscope, long, acicular crystals, which interlaced, were observed. The yield from a kilo of the Anatolian licorice root was not sufficient for further investigation.

Three kilos of the Persian variety were manipulated in the same manner, in order to detect the principle and isolate it in larger quantity. Crystals of the same character were obtained from this variety also, and at the same stage of the process, but the small amount so obtainable, as also the limited time at the author's disposal, precluded their further investigation.

Moisture and Ash.—To determine the comparative amounts of moisture and ash contained, estimations were made on four varieties of licorice root.

A weighed quantity of each variety was dried to a constant weight in an air-bath at a temperature of 110° C. The loss in weight was taken as moisture.

To ascertain the amount of ash, the dried residue from the moisture determination was incinerated until the organic matter was consumed and no further loss in weight was experienced. The results were as follows :

	Moisture.	Ash.
Anatolian	7.58	8.84
Persian	7.49	5.43
Turkish (Russian)	6.31	5.04
Spanish	6.81	4.65

The figures given in the foregoing table for Anatolian licorice represent the moisture and ash of the root that was submitted to the proximate analysis described in this paper.

Action of Acetone.—Acetone was applied to each of the varieties of licorice previously mentioned. The treatment was continued until exhaustion was complete. After recovering the greater quantity of the solvent by distillation, the extracts were evaporated to constant weights on a water-bath.

The extract from the Persian variety equalled 5.07 per cent. It was transparent and of a bright, ruby red color. The Anatolian root yielded 23.84 per cent. of an extract that was much darker than the extract of the Persian variety. 7.02 per cent. of extract was obtained from the Spanish licorice root. This extract was lighter in color than any of the others obtained from the four varieties of root.

The Turkish root furnished an extract that was darkest in color. It amounted to 14.06 per cent.

A quantity of the Anatolian root was treated with alcohol, sp. gr. .820, until exhausted. The amount of extract removed by this solvent was 13.74 per cent., as against 23.84 per cent. extracted by acetone.

Tannin.—The statement in Hanbury and Flückiger's Pharmacographia, that "a trace of tannin is found in the outer bark of licorice," led to some experiments by which the validity of that assertion might be tested.

A quantity of the outer bark of each of the four previously named varieties of the root was carefully scraped off. From these scrapings infusions were made by the use of cold water. The filtered liquids reacted as follows: Ferric chloride, no precipitates; ammonio-ferric sulphate, slightly dark precipitates; gelatin and alum afforded slight precipitates with the infusions, but others of the same character were obtained upon the addition of alum alone; dilute sulphuric or hydrochloric acid produced precipitates resembling very closely those caused by alum.

When these several reagents were applied to decoctions prepared from the outer bark by the use of hot water, the same reactions were shown.

To further investigate the possible presence of tannin, a decoction was made from a lot of ground drug that represented the entire root; the reagents, even when applied to this, failed to detect tannin. It may, therefore, be concluded that there is no tannin in licorice root.

STRUCTURE OF SASSAFRAS.—

BY EDSON S. BASTIN.

This American tree is the only living species of its genus, though the fossil remains from the cretaceous rocks of our Northwest prove that there were once several at least, and probably the genus was once as abundant in species as are now the oaks. This species has probably persisted beyond its congeners by reason of its ability to endure a wide range of conditions. This is evidenced by the fact that it thrives almost equally in the austere climate of Canada and in sub-tropical Florida, and that it endures almost every condition found in the forest regions between these Northern and Southern limits, and between the great plains on the West and the Atlantic coast on the East.

In the North it is a shrub, in middle and southern latitudes it is a tree, often with a trunk that attains a diameter of a foot or more, and a height of fifty or sixty feet. Its top, when growing in open ground, is also dense and shapely, so that the tree is not without value as an ornament to our parks and roadsides. The trunk is covered with a grayish, strongly-fissured bark, but the twigs remain green for several years, the corky layer being slow to form beneath the epidermis.

The alternate exstipulate, petiolate, deciduous leaves are remarkable for the variety of their forms on the same tree. Some are entire, oval and acute or obtuse, while others are more or less deeply separated into two or three unequal lobes, the lateral lobes being the shorter. This variability in the foliage of the tree has given origin to one of its botanical names, that recognized in the last edition of our Pharmacopœia, namely, *Sassafras variifolium*. This tree, in fact, well illustrates the vicissitudes of our botanical nomenclature. In the earlier editions of Gray's Manual we find it named *Laurus sassafras*, following Linnaeus. In the later editions it is called *Sassafras officinale*, the name given it by Nees. Salisbury named it *Laurus variifolius*, and now in the recent "List of Pteridophyta and Spermaphyta, growing without cultivation in Northeastern North America," the name *Sassafras Sassafras* (Linné) Karsten, is adopted, a name doubtless applied in strict accordance with the new rules for botanical nomenclature, but whose unpleasant effect upon the ear could not well be endured except in the hope, that sometime between now and the millennium our botanical nomenclature will acquire something like a stable equilibrium.

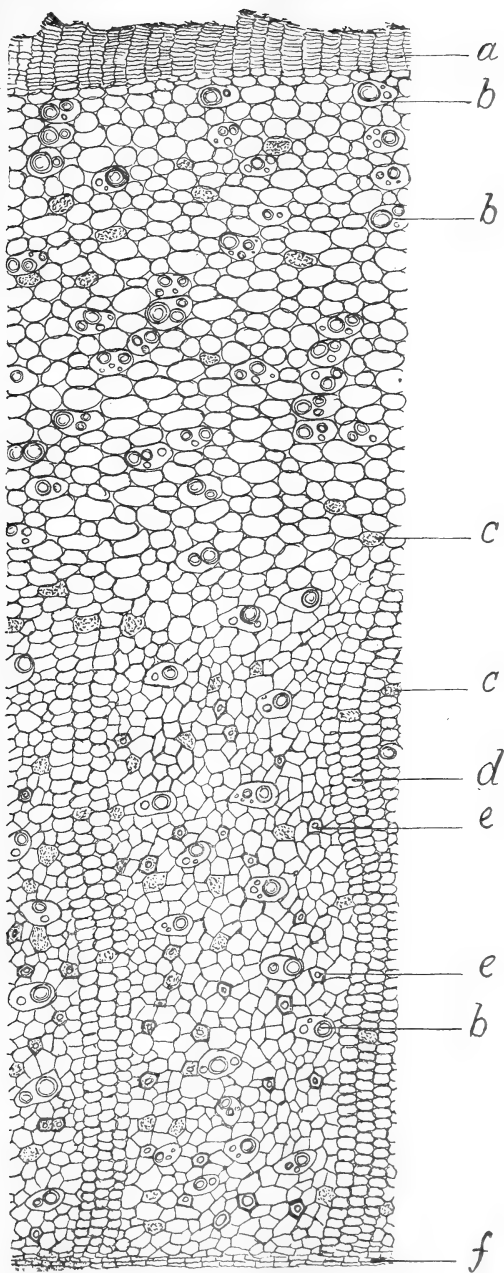


FIG. 1.

The tree is diœcious and the inconspicuous flowers appear in early spring, before or with the leaves. They are arranged in clustered corymb-like racemes which are involucrate with scaly bracts. The sepals, six in number and spreading, are yellowish-green, and in the staminate flowers the nine stamens are inserted in three whorls on

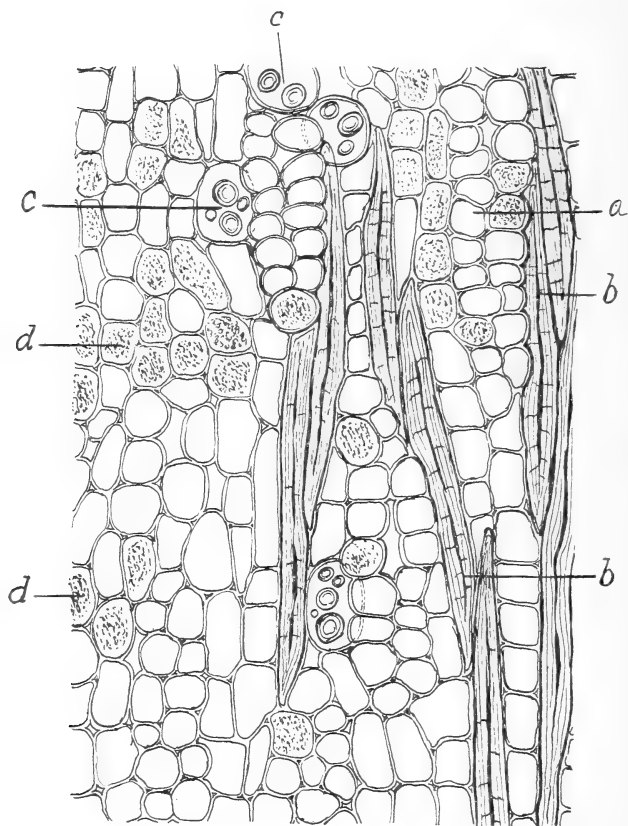


FIG. 2.

the base of the calyx. The stamens of the inner whorl differ from the rest in bearing at the base of each filament a pair of stalked glands, probably representing stipules. The anthers of all the stamens are introrse and have two pairs of loculi, one pair smaller and superposed over the other, and the loculi dehisce by valves.

The pistil in the staminate flower is wholly aborted. In the pistillate flower six stamens are present, but with wholly or partly aborted anthers and without pollen. The pistil is single, with an ovoid ovary and a single, rather short style terminated by a discoid stigma. The ovary contains usually a single ovule, which is anatropous and suspended from the top of the ovary.

The fruit is a bluish-black, ovoid drupe of the size of a pea, supported on a fleshy, club-shaped, reddish pedicel, crowned by the persistent reddish calyx teeth, which clasp the fruit at its base. The seed is exalbuminous.

All parts of the plant contain more or less of volatile oil, but this

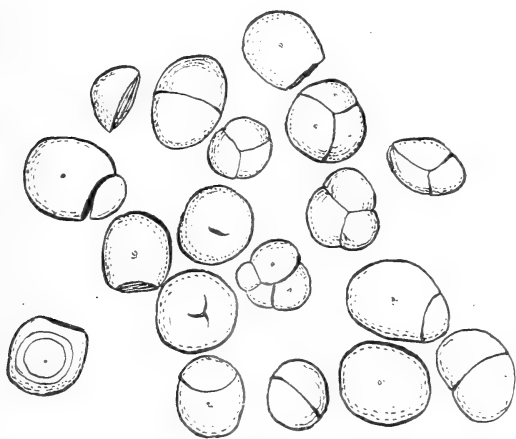


FIG. 3.

is much more abundant in the bark of the root, which, therefore, constitutes the most important medicinal portion.

The leaves and young twigs, particularly the pith of the latter, are rich in mucilage, which causes them to be employed, to some extent, for demulcent purposes.

A cross-section of the bark of a root which has attained a diameter of two inches or more shows a structure which is represented in the illustration, *Fig. 1*.

The friable exterior corky layer shows the usual microscopic appearance of corky tissue. The thickish middle bark beneath it is rich in oil cells, which average larger in size than the parenchyma cells among which they are scattered.

Oil cells are not confined to this layer, but occur, though somewhat less abundantly, among the sieve and companion cells of the inner layer of the bark. Parenchyma cells, rich in tannic matters, are also freely scattered through the middle and inner layers.

The medullary rays, whose course in the bark is usually some-

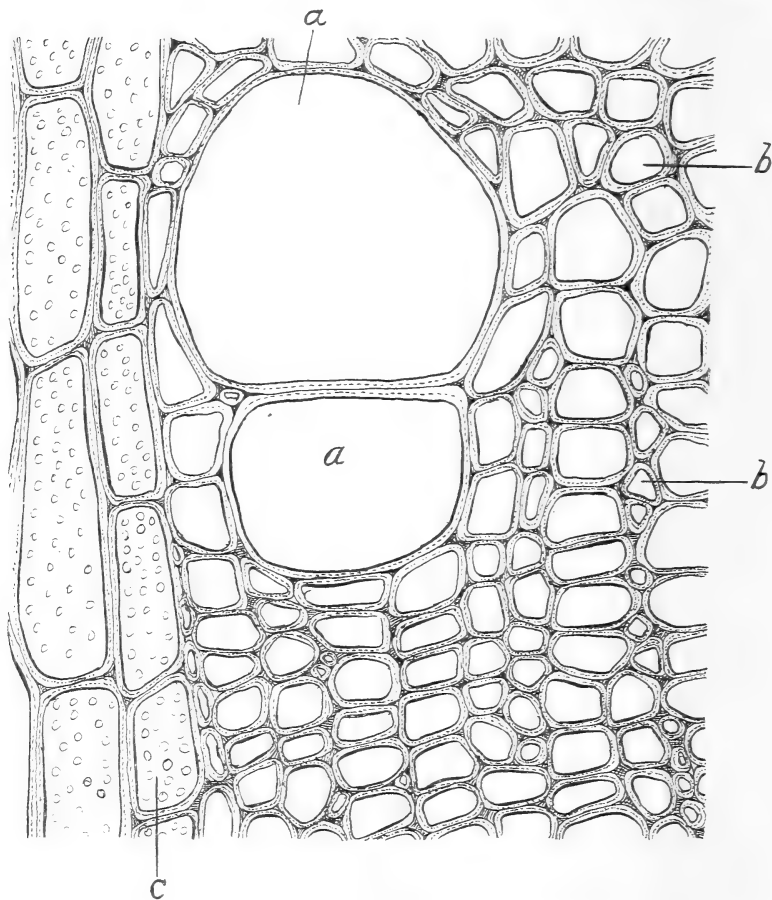


FIG. 4.

what wavy, are composed sometimes of one, sometimes of two, and more rarely of three rows of cells.

No primary bast fibres are formed in the root bark, and the bark of roots not more than two or three years old is usually destitute of bast fibres of any kind.

Later on, however, secondary bast fibres are formed, but these are never so abundant as to give an evident fibrous fracture to the inner layer of the bark. They are scattered without apparent order through the bast wedges, and are not usually clustered, though occasionally two or three may be seen in juxtaposition.

They are excessively thick-walled, and, for bast fibres, short, their length being not more than from ten to fifteen times their thickness. They are also hard and brittle.

If the bark be gathered in late autumn or in very early spring, the parenchyma cells of the bark, and even the thinnish-walled wood cells and medullary ray cells of the medullium, are found to be heavily charged with starch grains. These are of rather small size, and, when single, are spherical or spheroidal in shape, with a central hilum, which sometimes shows a few stratification circles about it. The circles, however, are usually indistinct or wanting. The hilum is usually entire, and appears, even under a very high power, as a mere point, but it is sometimes angularly fissured. Compound grains, however, are more common than simple ones, the commonest being double and triple ones, though more complex forms are not uncommon.

In most structural characters the wood of the root and that of the stem resemble each other closely. The ducts, which are mostly of the pitted variety, with the pits closely arranged, are, in both, of large diameter, and usually grouped in twos or threes, but sometimes single. They agree also in the fact that the walls of the wood cells do not become so strongly thickened as they do in many other woody plants, and in the fact that the medullary ray cells are of rather large diameter as compared with the wood cells, are usually elongated in a radial direction, and are finely pitted. They differ chiefly in the conspicuous large-celled pith of the stem, which, of course, does not occur in the root at all, and in the fact that in the stem the medullary rays are rather more numerous and inclined to become fewer-rowed, three-rowed rays being seldom found.

The differences between the bark of the stem and that of the root are more conspicuous. Besides the inevitable difference due to the presence of chlorophyll in the middle bark of the former and its absence in the latter, and the difference in cork formation already alluded to, namely, the fact of its much more tardy formation in

the bark of the stem, the stem-bark contains clusters of numerous primary bast fibres associated with stone cells, which form an interrupted zone at the junction of the middle with the inner bark. Both primary bast fibres and stone cells are wholly wanting in the root-bark. The secondary bast fibres of the stem are similar in structure and arrangement to those of the root.

The volatile oil cells of the stem-bark, while they have a distribution quite similar to that in the root-bark, are very much less abundant.

DESCRIPTION OF FIGURES.

Fig. 1.—Transverse section of the root-bark of sassafras taken from a root about 2 inches in diameter. Magnification about 50 diameters. *a*, cork ; *b, b, b*, volatile oil cells ; *c, c*, cells containing tannic matters ; *d*, medullary ray ; *e, e*, bast fibres ; *f*, cambium.

Fig. 2.—Small portion of longitudinal-tangential section of inner bark. *a*, medullary ray cell ; *b, b*, bast fibres ; *c, c*, volatile oil cells ; *d, d*, cells containing tannic matters. Magnification about 110 diameters.

Fig. 3.—Starch of sassafras bark. Magnified 750 diameters.

Fig. 4.—Small portion of medullium of root. Magnified 370 diameters. *a, a*, pitted ducts ; *b, b*, wood cells ; *c*, medullary ray cell.

SOME COMMERCIAL COCOAS.—

BY FLORENCE YAPLE, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 142.

The history of cocoa, as an exhilarating and agreeable beverage, dates back to the time of the discovery of America by Columbus, it having been largely used by the natives of tropical America at that time. Introduced into Europe by the above discoverer, the drink became fashionable among the wealthy classes, and it was so highly esteemed by Linnaeus that he gave to the plants producing this fruit the name *Theobroma*, which means food of the gods.

The commercial activities of our time have increased the production and thereby cheapened the price of the commodity, so that now the cocoa preparations are largely consumed by all classes of people. The most popular of these are the so-called chocolates and cocoas, the latter probably superseding the former for table use, or, more particularly, in the preparation of the beverage.

Chocolate is made by grinding the roasted beans deprived of the husks, in heated rollers, which soften the fat, and while in this pasty condition the mass is mixed with sugar and afterward pressed in moulds. In the preparation of cocoa, the roasted beans, also deprived of the husks, are reduced by grinding to a fine, smooth paste and placed in bags and subjected to powerful pressure in heated presses. The fat exudes slowly and the residue, which is a solid, compact cake, is broken in pieces and finely powdered for use.

In practice, there are many modifications of these processes, such as the addition of flavoring and coloring substances and materials to give consistency, and sometimes even to give weight to the finished preparations.

The cocoas prepared as outlined above are considered more palatable and digestible than the chocolates, and hence are deemed worthy of a distinct classification.

It was with the view of making a comparative chemical examination of a few of the more popular brands of this class that the present work was undertaken.

The following is a list of the names of the preparations examined :

(1) Rowntree's Elect Extract of Cocoa ; (2) Huyler's Caracas Cocoa ; (3) Breakfast Cocoa (Croft & Allen) ; (4) Miller's Breakfast Cocoa ; (5) Fry's Cocoa Extract ; (6) Walter Baker & Co.'s Breakfast Cocoa ; (7) Van Houten's Pure Soluble Cocoa ; (8) Bendsdorp's Pure Royal Dutch Soluble Cocoa ; (9) J. & C. Blooker's Dutch Cocoa ; (10) Wilbur's Breakfast Cocoa ; (11) Cadbury's Cocoa Essence , and (12) Whitman's Pure Cocoa.

A moisture determination was first made by subjecting two grammes of the powder contained in a crucible to a temperature of 100° C. until a constant weight was obtained.

The dry residue from the preceding operation was then ignited at a low, red heat until the weight remained constant. The ashes were all light gray in color, some of them being nearly white or having a pinkish tinge. These were examined qualitatively, and were found to be composed almost entirely of the phosphates and carbonates of potassium, magnesium and calcium, with a small per cent. of iron in No. 1, and a trace of sodium in No. 7. The high percentages of ash in Nos. 8 and 9, and the still higher per cent. in

Nos 1 and 7, led to a further examination as to their solubilities in water and acid.

The water-soluble portion was obtained by treating the ash with water, filtering, evaporating filtrate and then carefully heating the residue. The portion insoluble in water was then treated with dilute hydrochloric acid and the insoluble residue carefully washed, dried and heated to redness.

It was found that in those samples having a high per cent. of ash, the proportion soluble in water was two or three times larger than in those brands having a lower per cent. of inorganic constituents.

The fat was determined in the following manner: 5 grammes of the powder were placed in a test tube and agitated with a convenient quantity of petroleum ether and allowed to settle, when the clear liquid was separated; this was repeated four or five times, or until all of the fat was removed. The petroleum ether was allowed to evaporate spontaneously, and the fat so obtained placed in a desiccator to deprive it of moisture. The melting point was then ascertained by simply exposing this residue contained in a beaker to the temperature of a water-bath. The melting points, so ascertained of the several samples, were found not to vary much, the range being from 37° C. to 40° C. This, together with the general appearance, was thought to indicate the genuine character of the fat contained in these brands.

The residue left after the extraction of the fat was exhausted with hot alcohol, sp. gr. 0.850, and this extract, while still warm, treated with basic lead acetate, to precipitate tannates, tartrates, etc. The filtrate was then evaporated, the residue taken up with chloroform, the mixture filtered, and the residue obtained upon evaporation to dryness weighed as theobromine.

That part of the sample undissolved by the treatment with hot alcohol was treated with cold water until the filtrate was nearly free from color, and the aqueous solution so obtained was evaporated to dryness and weighed as extractive.

The portion undissolved by the foregoing solvent was dried at 100° C. and calculated as starch, fibre, etc.

For the determination of starch 100 mg. of this residue were gently boiled for two hours with 50 c.c. distilled water acidulated with 2 per cent. of dilute sulphuric acid in a 250 c.c. flask, the water lost by evaporation being replaced from time to time. After filter-

ing and bringing the measure up to 100 c.c., 50 c.c. were made alkaline with sodium hydrate solution, filtered, 50 c.c. of Fehling's solution added, and the liquid kept at a temperature of 90° C. for half an hour, then filtered and the precipitate well washed with hot water, dried, ignited and the percentage of starch calculated from the cupric oxide so obtained.

Another portion of the powder, after treatment with ether to remove fat, was examined microscopically for the detection of foreign starches. The results were mostly negative as only one, No. 11 contained more of a foreign starch than would be allowable by accident. In No. 4 the character of the starch was somewhat changed by fermentation, and in No 7 the granules were considerably disintegrated, due probably to excessive heating. No. 2 contained a rather large amount of starch, but it seemed to be that of genuine cocoa.

The nutritive value that the cocoas are supposed to possess suggested the importance of a nitrogen determination that an idea of the quantity of albumenoids present might be had. To accomplish this, Kjeldahl's process was essentially carried out as follows: About 1 gramme of the powder was placed in a 500 c.c. flask with approximately 700 mg. of freshly precipitated and thoroughly washed mercuric oxide, 50 c.c. of sulphuric acid were added, the flask containing the mixture placed on a sand-bath, the heat regulated until frothing ceased, and the mixture raised to the boiling point until the liquid was clear and of a light straw color. To this liquid, while warm, potassium permanganate was gradually added until a permanent purple color was imparted. The addition of the potassium permanganate required considerable care, and it was necessary to add small quantities of water from time to time to keep the contents of the flask in a liquid condition. 25 c.c. of a solution of potassium sulphide (40 grammes in 1,000 c.c. of distilled water) were then added, and to this 50 c.c. of a saturated solution of potassium hydrate, or enough to render the liquid alkaline, and lastly, a few pieces of granulated zinc. This mixture was then distilled by means of a Liebig condenser into 50 c.c. of decinormal volumetric solution of oxalic acid, and the excess of acid neutralized by decinormal volumetric potassium hydrate solution. The albumenoids were calculated from these figures after having deducted the percentage of nitrogen found to exist as theobromine.

The following summary will serve for a comparative consideration of the results obtained by analysis :

Nos.	Moisture.	Ash.	Fat.	Extrac- tive.	Theobro- mine.	Starch.	Albume- noids.
1	4'05	7'70	30'82	7'48	1'08	—	15'22
2	4'27	5'54	34'04	7'44	1'02	11'26	17'29
3	3'98	4'24	32'48	6'52	0'56	17'65	17'27
4	3'99	4'05	38'76	7'52	1'06	20'71	6'77
5	4'33	4'28	31'16	5'26	1'36	16'07	12'78
6	4'44	5'23	27'52	6'62	1'28	23'34	15'74
7	4'53	8'19	29'78	9'88	0'69	21'26	17'03
8	4'59	6'69	33'06	8'52	0'88	11'33	11'41
9	4'64	6'70	31'78	7'70	1'22	15'90	16'87
10	3'84	4'69	33'32	5'84	0'82	16'94	16'74
11	4'00	4'70	27'58	6'48	0'70	21'05	13'58
12	2'70	4'15	37'68	4'10	0'66	16'26	14'13
Average . .	4'11	5'51	32'33	6'94	0'94	17'43	14'56

These results do not warrant the conclusion that any of the above samples were adulterated, but rather point to the fact that they were free from any appreciable amount of foreign admixture.

The percentage of fat, however, was found to be more than some of the manufacturers' claims would lead us to expect.

The high ash in Nos. 1, 7, 8 and 9, and the dark color produced when the samples were heated with water, naturally led to the conclusion that they had been treated with a small quantity of inorganic material, probably for the purpose of rendering them more soluble.

NOTES ON SOME SAPS AND SECRETIONS USED IN PHARMACY.

By P. L. SIMMONDS, F.L.S.

[Continued from p. 256.]

Narthex asafœtida, Falconer; *Ferula Narthex*, Boissier. The *Ferula asafœtida*, Linné, of Persia, Afghanistan and Turkestan yields the ordinary medicinal gum resinous exudation locally known as *Anguzi*, but in India the pure drug is called "Hing," and the coarser kind "Hingra." *Asafœtida* contains two essential oils; although the odors of oil of garlic, oil of onions and *asafœtida* are similar, *asafœtida* contains no trace of allyl. An exhaustive paper on this essential oil has been published by Dr. Semmler. Its density is about 0.984.

Asafœtida is commonly used by the Mahomedan population of

India and the vegetarian Hindoo classes, as a favorite ingredient in their curries, sauce for pillaus, and other dishes, especially mixed with rice and dal or pulse on account of its stimulant, stomachic properties. The Turkomans are very fond of the young shoots dipped in vinegar. But it is not an article of general consumption in Afghanistan itself. The fresh leaves of the plant, which have the same peculiar odor as its secretion, when cooked, are commonly used as a diet by those near whose abode the plant grows. The white inner part of the stem of the full-grown plant is considered a delicacy when roasted and flavored with salt and butter. India seems to be the principal consumer of this gum resin, as the imports there range from eight to nine thousand hundredweight annually. Its uses in Persia are very numerous, especially as a medicine. There are people there who are so accustomed to its use for nervous complaints that it is like opium to the opium eaters—one of the necessities of life. Its excellent anti-spasmodic qualities are too little known and appreciated in Europe.

The liquid form of asafœtida has, from the remotest times, been held in great estimation by Eastern doctors, and was once regarded as worth its weight in silver. It is highly esteemed as a carminative and condiment. If taken daily it is said to prevent the attacks of malarious fever.

Among the ancients, condiments to stimulate the sluggish appetite seemed to be in chief demand. Amongst these asafœtida, which is to-day highly relished in Persia and the East, was an indispensable ingredient; and it is even now used moderately by cooks in Europe to give flavor to some dishes and meats.

Opopanax Chironium, Koch. This gum resinous exudation from the juice of the roots is met with in lumps and tears, is opaque, of a disagreeable balsamic odor, of a bitter acrid taste. It has a slight resemblance externally to myrrh. In most of its properties it closely resembles asafœtida, and is now scarcely used in medicine in Europe, although found in the bazars of India.

Papaver somniferum, Linné. The concrete, inspissated juice from the capsules of this poppy, known as opium, is a valuable narcotic and anodyne, obtained by scratching the capsules and collecting the juice. Great Britain imports from 400,000 to 500,000 pounds of opium annually for medicinal purposes, chiefly from Turkey and Persia. The imports into the United States since the duty has been

removed, on October 2, 1890, have increased. The imports, in 1890, were 473,095 pounds of crude or unmanufactured, valued at £1,183,-712 and 34,465 pounds prepared for smoking, value £269,586.

In the financial year ending to 1893, the imports were, of crude, 615,957 pounds, value £1,186,824.

The chief seat for the production of opium is India, where the export trade to China used to average 126,000 cwts., valued at £10,000,000, but of late years has been falling off.

The exports were:

	Cwts.
1869	74,955
1879	125,765
1889	122,160

The exports from India in the recent financial years, ending in March, have been as follows:

	Quantity, Cwts.	Value.
1891-92	121,701	£9,562,260
1892-93	104,658	9,255,013
1893-94	97,910	8,019,428
1895 (11 months, to February 7th)	89,865	8,617,604

The poppy is largely grown for the opium it yields in many of the provinces of China, hence the Indian exports now go to many other countries, especially Cochin China and the Straits settlements. The export share of the two provinces has been as follows, in late years:

	Cwts. Bengal.	Cwts. Bombay.
1891-92	83,221	38,480
1892-93	70,615	34,043
1893-94	63,853	34,057

The imports of sorts of opium into China in each of the last two calendar years (January to December) have been as follows, in piculs, of 1¼ cwt.:

	1892. Piculs.	1893. Piculs.
Malwa (Bombay)	27,782	28,694
Patna	18,877	20,295
Benares	15,353	12,121
Persian	7,770	6,998
	<hr/> 70,782	<hr/> 68,108

The returns for 1894 are not yet to hand, but the Statistical Secretary of the Customs at Shanghai, in his report for 1893, stated: "The protection of the rupee enhanced the price of opium so

greatly that it placed the Indian drug beyond the means of a vast number of consumers, and this rise taking place concurrently with adequate supplies of native opium—which has so improved in quality that, it is averred, smokers prefer it to Malwa—renders it almost hopeless for the imported drug to continue to compete successfully with the excellent and ever-improving home-grown product.”

There are two kinds of opium made in India ; that for export to China is called “ provision opium ;” that to be used locally is known as “ excise opium,” and is moulded into cakes, which are stamped with the device of an Imperial Crown, and the legend “ Benares Abkari,” from being made in that district.

Excise opium, for internal consumption, is retailed to the consumer as a decoction, or in the form of two smoking mixtures, known, respectively, as Chandu and Madat. The excise opium yields to the Indian Government a revenue of about 1,000,000 sterling.

The opium for export is made up into round cakes or balls, about the size of a 24-lb. spherical shot. These are packed for shipment in chests, in two layers of 20 each, and the chests weigh about 140 pounds.

The expediency of the Government production and supply of Indian opium to China has been much discussed and questioned, and a commission has been taking evidence and reported on it.

It is doubtful whether the moderate use of opium smoking is more injurious to the system than other narcotics and intoxicants, and especially when the habit has been confirmed and is almost general in China, and the culture of the poppy is allowed and fostered in many of the provinces of the Empire.

The stimulant effects of opium are most apparent from small doses, which increase the energy of the mind, the frequency of the pulse, etc. These effects are succeeded by languor and lassitude. In excessive doses it proves a violent and fatal poison.

In disease it is chiefly employed to mitigate pain, produce sleep, and to check diarrhœa and other excessive discharges. It is also used with good effect in intermittent and other fevers. Combined with calomel, it is employed in cases of inflammation from local causes, such as wounds, fractures, etc. ; it is also employed in small-pox, dysentery, cholera, and many other complaints. It is taken in various forms in different countries.

The Chinese both smoke and swallow it. In Turkey it is chiefly taken in pills, being sometimes mixed with syrup to render it more palatable.

In England the drug is administered either in its solid state, made into pills, or as a tincture in the shape of laudanum. The natives of India take it in pills or dissolved in water. In upper India an intoxicating liquor is prepared by beating the capsules of the poppy with jaggery and water.

The native practitioners consider opium to be injurious in typhus fever, but they administer it in intermittents, lockjaw, and in certain stages of dysentery; externally, they recommend it in conjunction with arrach, aloes, benzoin and bdellium, in rheumatic affections. They consider, however, after all, that it is merely efficacious in giving temporary relief.

Persian opium is cultivated principally in Yezd and Ispahan, and partly in the districts of Khorassan, Kerman, Fars and Shushtes.

That grown in Yezd is considered to be better than that of Ispahan and elsewhere, owing to the climate and soil of the place being better adapted to the growth of the poppy. The crop comes to hand in May and June, and the greater part of the opium finds its way to the shipping ports between September and January. These ports are Bushire and Bunder Affas. The Persian opium was formerly not much liked in China, owing to its having a peculiar flavor, caused by the mixture of a large quantity of oil during the process of preparation, and owing, also, to its being sometimes found adulterated. It, however, finds a better market in London, inasmuch as it contains, on an average, a larger quantity of morphia. From Yezd a quantity of opium prepared in the shape of small sticks or cylinders, is sent to Herat, and a small quantity in this form is locally consumed for smoking and eating.

Opium smoking is very prevalent in Yezd, and it is said that more is used in this place in that way than in any other town in Persia, with the single exception of Kerman. The habit is gaining ground daily throughout the country.

In late years there has been a decided decrease in the crop of Persian opium. A few years ago an average crop would be reckoned at 4,000 boxes; in 1889, a fair year, it was about 3,000; in 1893 it was only about some 2,000, but for 1894 an area was planted which is calculated to give some 2,500 boxes. It was anticipated that in

1895 a very much larger quantity will be planted. The Persian merchants are looking with keen and anxious eyes to the report of the opium commission in India, and their future conduct will be greatly biased by it.

In Khorassan the cultivation of the poppy has increased ten-fold within the last fifteen years. That destined for China is mixed with linseed oil, in the proportion of 6 or 7 pounds to each chest. That sent to England is pure. Persian opium is fast overtaking Patna opium in Chinese estimation, according to the advancing prices. A very few years ago it was quoted at less than half the price of the Indian drug.

The poppy is now grown in many parts of Europe, France, Germany, etc., and is even extending to Australia and Africa. Opium raised in Europe is stated to yield from 8 to 13 per cent. of morphine. The main value of opium depends on its contents of morphia, for which the genus *Papaver* (as far as heretofore known) remains the sole source.

Not less than fourteen alkaloids have been detected in opium by the progressive strides of organic chemistry.

The Persian opium is packed in chests containing a little over 1 cwt. The price in 1894 was £71, 10s. to £72, 10s. per chest. It is nearly all prepared for the China market, and there are only one or two native merchants who have sufficient knowledge to prepare the high-class article required by the London market. The crop was smaller than in previous years.

The total quantity prepared in Shiraz was about 1,300 chests, of an approximate value of £93,500.

The partial destruction of the opium crops in 1893 was a heavy blow to Persian commerce. The yield for the year was very poor, and the value of the total export shows a decrease of £132,000 when compared with the export of 1892. The exports from the port of Bunder Affas in 1892 and 1893 were as follows:

	Chests.	Value.
1892	746	£37,300
1893	743	36,578

Peucedanum Galbaniferum and *Polylophium Galbanum*.—These two plants are said to furnish the medicinal gum resinous exudation known as galbanum. It used to be referred to *Ferula galbaniflua*, Boissier, a Persian species. Galbanum may be distinguished from

other gum resins by its somewhat musky odor, and by being easily indented by the finger nail, especially where the tears have a blueish tint. It is more or less brownish-yellow, at ordinary temperatures tough, brittle when cold, of disagreeable smell, and acrid, nauseous, bitter taste. It is indigenous to Africa and sent to Constantinople under the name of "Khasni." The root is of a roundish form and about the size and shape of a large black radish, with two spreading shoots. The British imports are merely nominal. Galbanum is frequently used for plasters, and inwardly for menstrual illnesses in the country of its growth.

(*To be continued.*)

NOTES ON THE EIGHTH EDITION OF MARTINDALE'S "EXTRA PHARMACOPŒIA."

BY JOSEPH W. ENGLAND.

The eighth edition of William Martindale's "Extra Pharmacopœia" has just been issued through publisher H. K. Lewis, of London, England; and while it is largely based on the British Pharmacopœia and procedures of British pharmaceutical practice, it refers as well to the products and preparations of the U. S. Pharmacopœia. The work has a national reputation in Great Britain, and presents many features of interest to all pharmacists. It is not the writer's intention to review the book in this paper, but simply to jot down a few cursory thoughts on subjects of general interest which have occurred in perusing it.

Oddly enough, on page 123 reference is made to the "A. C. E. Anæsthetic Mixture" of alcohol (S. G. 0.838) 1 volume, chloroform (S. G., 1.497) 2 volumes, and ether (S. G., 0.735) 3 volumes, that found favor in this country some years ago. This mixture has been condemned by American surgeons, on the ground that its rate of volatilization is unequal, so that the anæsthetized patient is subjected to varying vapors, and not to an anæsthetizing vapor of uniform composition. Mr. Martindale has recognized this fault, and claims to obviate it by using the following formula: Absolute alcohol (S. G., 0.795) 1 volume, chloroform (S. G., 1.497) 2 volumes, and ether (S. G., 0.720) 3 volumes. He presents the results of experiments in support of this claim, which show a practically uniform rate of evaporation. The mixture has a specific gravity of about 1.01.

Prepared with U. S. P., absolute alcohol, chloroform and ether, the mixture would have a slightly lower gravity.

It is singular to note the influence that water in ether has of retarding anæsthesia. The writer has frequently observed that the higher the specific gravity of an ether, the greater the amount of it that was required to produce anæsthesia. To a degree, the higher the gravity of an ether, the more water it contains, and it seems reasonable to believe that it is the presence of water in ether and not so much the alcohol that retards anæsthetization, or rather renders an increased amount of ether necessary to produce it. That this is Mr. Martindale's opinion also, is evident from his improved formula for the "A.C.E. Mixture," in which he seeks to minimize, as far as practicable, the percentage of water present, by using absolute alcohol, and an ether stronger than that contained in the original formula. This "A.C.E. Mixture" is alleged to be safer than chloroform, and quicker in action than ether, though not so quick as chloroform; and the improved formula certainly deserves a thorough trial.

If petrolatum possesses therapeutic virtues—which, apart from its being demulcent to the mucous membrane of the alimentary canal, is doubtful—a formula for an emulsion of it with hypophosphites is given on p. 331, as follows:

Soft petrolatum	5 ounces (av.)
Powdered acacia	2½ ounces (av.)

Mix and add 4 fluid ounces of water. Dissolve 120 grains each of sodium hypophosphite and calcium hypophosphite in 6 fluid ounces of water. Add to the above with constant trituration, and then add a sufficient quantity of water to measure 15 fluid ounces. Dose: 1 to 4 teaspoonfuls.

In the making of tincture of strophanthus, Mr. Martindale gives preference to Fraser's process as improved upon by himself (*i. e.*, exhausting the ground and dried seeds with ether, drying and exhausting with alcohol), to the U.S.P. process of simply percolating with a diluted alcoholic menstrum (alcohol 650 c.c. to water 350 c.c.) without prior exhaustion with ether. In the writer's experience, Mr. Martindale's process is decidedly the better of the two. It may require a longer time than the present U.S.P. process; but the final product is surer of representing all the therapeutically active principles of the drug.

The author refers interestingly to Terebene (p. 410). He claims that, chemically, it consists of camphene, cymene, borneol and terpinene, the last named of which is alleged to be the active or toxic constituent of terebene.

The U.S.P., '90, states that terebene consists chiefly of pinene, and contains not more than very small proportions of terpinene and dipentene. Sadtler and Trimble, in their new text-book on "Chemistry" (p. 781) quote Dr. F. B. Power as stating that it consists chiefly of the hydrocarbons dipentene and terpinene, with some cymene and camphene. For the internal administration of terebene, other than inhalations of vaporized terebene, Mr. Martindale recommends the conventional method of giving the terebene in sugar. A much better way, in the writer's opinion, is to admix the terebene with an equal volume of olive oil, and emulsify with powdered acacia, sugar and water, flavoring with oil of gaultheria; each teaspoonful to contain 5 minims of terebene.

The formula is given (p. 224) for the French product "Glycero-alcohol," as follows: Glycerin, 333, distilled water, 146, and alcohol, a sufficient quantity to measure 1000. It has a specific gravity of about 1. It is much used in Paris as a solvent of alkaloids and other proximate principles, keeps indefinitely, and does not readily evaporate. It could doubtless be often used with advantage by American pharmacists for the making of standard solutions of alkaloids, etc.

Paraldehyde (p. 55) is recommended to be given in diluted syrup or almond mixture. A better method is to mix it with an equal volume of olive oil, and emulsify with powdered acacia, sugar and water, flavoring with oil of gaultheria. The writer of this paper is disposed to question the statement made on p. 56 that paraldehyde is probably the *principal* therapeutic agent in *Spiritus Ætheris Nitrosi* B.P. It may be an important constituent, but surely the contained ethyl nitrite is of equal or greater importance. It is known that paraldehyde has absolutely no diaphoretic action on the human economy, and from this fact it is very evident that the diaphoretic action of spirits of nitrous ether must be due to some constituent other than paraldehyde, and this is most probably ethyl nitrite.

For the making of "Creosote Pills," Mr. Martindale recommends (p. 180) the following formula:

Creosote	2 flu'id drachms.
Powdered soap	120 grains.

Place the creosote in a one ounce wide-mouth, stoppered bottle, add the soap, and mix well. Then digest on a water bath until they combine. Each 2 grains of the mass will contain, practically, 1 minim of the creosote. This mass can be combined with other ingredients without decomposition, as occasion requires.

The writer of this paper has used the following formula :

Creosote	12 minims.
Powdered licorice root	18 grains.

Triturate well until the licorice root has absorbed the creosote, and then add :

Powdered soap	1 grain.
Powdered acacia	6 grains.

Make up into a mass with an excipient of glycerin and syrupy glucose (1 part by volume of the former to 4 parts by volume of the latter). Divide into 12 pills, and enclose in gelatin capsules.

The licorice root absorbs the creosote, the soap—small in quantity as it is—softens the fibrous mixture, the acacia gives adhesiveness, while the excipient helps to form a plastic, non-friable mass readily made into pills. Encapsulating in gelatin is essential to mask the creosote odor.

The objection is sometimes made to creosote pills that only small quantities of creosote can be given in this way. Where relatively large quantities of creosote are desired to be given an excellent method is to admix the creosote with twice its volume of olive oil, and enclose in gelatin capsules. The use of the fixed oil in this connection is not objectionable. In point of fact, there are reasons for believing that its presence is of value in diminishing the causticity of creosote upon the gastric mucous membrane and in promoting its absorption.

SAGO CULTIVATION IN NORTH BORNEO.¹

(*Metroxylon Sagu*, Rottb. *Metroxylon Rumphii*, Mart.)

The sago of commerce is a kind of starch prepared from the soft internal stems of certain palms, natives of the Malay Archipelago, Borneo, New Guinea, and possibly of Fiji. The word sago or sagu is said to be Papuan for bread.

There are two well-recognized species of sago palms. The smooth or spineless sago palm (*Metroxylon Sagu*) is specially abundant in

¹ Kew Bulletin.

Sumatra and adjacent islands. It does not reach so far eastward as New Guinea. In North Borneo it is known as *rumbia benar*. Wet, rich soils, especially at the base of mountains, are its favorite localities. This species is regarded as the principal botanical source of the sago received in Europe.

The thorny sago palm (*Metroxylon Rumphii*) is found further east than the other species. It is plentiful in New Guinea, and in the Moluccas and Amboyna.

Both sago palms resemble each other in general appearance, but the latter is a smaller tree, and it has its leaf-stalk and the sheaths enveloping the lower part of the flower spikes armed with sharp spines from one-half an inch to about one inch long. It has, moreover, decided littoral tendencies, and is abundant along the shores of many small islands, forming a dense, impenetrable belt. In North Borneo the thorny sago palm is known as *rumbia berduri*, or *rumbia salak*.

Some sago is obtained from the sugar palm (*Arenga saccharifera*) after the plant is exhausted of its saccharine juice. The sago palm of India is *Caryota urens*. The farinaceous part of the trunk of old trees is said by Roxburgh to equal the best sago from the Malay islands. In China, Japan and Florida, sago, differing in character of the starch grains from palm sago, is obtained from species of *Cycas* such as *C. revoluta* and *C. circinalis*. The commercial importance of the latter is very slight.

The cultivation of the true sago palms is entirely confined to the Eastern Archipelagos. The plants are difficult to grow elsewhere, and it is improbable that the industry will extend beyond its present limits. Both species of *Metroxylon* are monocarpic, and die after the seeds are ripened. The life of the plant lasts for about fifteen to twenty years, at the end of which period the terminal inflorescence is formed. In spite of the abundance of flowers very few fruits are produced; these occupy two or three years in ripening. The propagation of these palms is usually effected by means of suckers or stolons formed around the base of old trees.

An interesting account of sago cultivation in Province Dent, in British North Borneo, is included by Governor Creagh in the report on the Blue Book of Labuan for 1893. (*Colonial Reports*, No. 122, Annual, 1894.) As the subject has not hitherto been dealt with in these pages, the report, which has evidently been carefully prepared

on the spot by Mr. J. G. G. Wheatley, is reproduced for general information.

A REPORT ON SAGO CULTIVATION IN PROVINCE DENT.

The sago palm, from which is manufactured the well-known sago flour of commerce, resembles in appearance the cocoanut tree. The former is valued for its trunk alone, the nuts are useless, and the tree dies if allowed to fruit.

VARIETIES OF SAGO PALM.

(1) There are only two kinds of sago palm which are cultivated, the "rumbia benar" (true sago), and the "rumbia berduri" (the thorny sago), also known as "rumbia salak." In appearance both are the same, but on close inspection the stems of the latter, to which the leaves are attached, known as "pallapa," will be found to be covered with bunches of thorns about $1\frac{1}{2}$ to 3 inches long.

MODE OF PLANTING.

(2) Sago grows chiefly on damp ground, subject to floods at certain times of the year. If grown in swamps, less sago is produced, and the trunks do not attain as great a height as when planted on clayey damp soil subject to floods periodically. Once planted, the tree withstands floods and brackish water, but in the latter it does not grow as fast and the trunks are small. Sago is planted chiefly by suckers sent out by the parent tree, which are carefully cut off under ground. In swampy ground the shoots are planted out at once, but in other localities the shoots are tied together in bundles and placed in wet, muddy ground until they have begun to send out roots, when they are planted out in holes 12 inches deep, 1 foot in diameter, and 4 to 6 fathoms apart. No earth is placed about the roots, but the plants are supported in an upright position by two sticks fixed on either side. The earth gradually fills the holes during rains and floods. One man with an assistant can plant 300 plants a day. After this, further attention is generally unnecessary for a year, and in some cases two years, when the jungle growth is cleared around the growing tree. Some planters regularly clear around the roots and cut away suckers if they are too abundant. *Rumbia berduri* is preferred to the *rumbia benar*, chiefly because the wild pigs do not attempt to destroy young plants, on account of the thorns. In planting *rumbia benar*, fences have to be made to keep out the pigs, which are very destructive. *Rumbia berduri* is

also reported to produce more raw sago, but the quality of flour is the same in both species. Each tree produces from four to five pikuls of raw sago (133 lbs.=1 pikul), being at the rate of one pikul per fathom of trunk. Both trees grow to the same dimensions, 24 to 42 feet in height, and in 1½ to 3 feet in diameter at the base of trunk. The sago palm is not subject to any disease; but, if a deep cut is made at the base of the trunk close to the earth, the pith is attacked by large maggots, which gradually eat their way into the centre of the tree, and in three or four months destroy the whole trunk. This is a favorite way of paying off a grudge among the natives. The sago tree takes from five to seven years to mature, according to the nature of the soil. During the third year the plant begins to send out shoots. These grow up with the parent tree, and in time give out suckers. If these are allowed to grow too freely they form a dense thicket around the mature trunks and give a great deal of trouble to the workers. Every year each clump produces a large number of workable trunks. During the fifth year the parent tree is ready to be cut down. In the meantime, the young shoots are rapidly developing, and in the seventh year probably three or four trees are ready, and so on, so that the sago tree, once planted, continuously supplies the planter with logs without giving him any trouble as regards their cultivation. The natives compare their sago plantation to a herd of cattle, and it would be difficult to reckon the number of logs that each clump may have produced in the space of forty or fifty years. When the sago tree is allowed to flower, the pith begins to diminish, and, if the mature trunks are not cut down regularly, the whole clump gradually deteriorates and the trees become stunted bushes instead of growing to the usual height. Nothing of the sago tree is lost. The trunk supplies the sago, the leaves and stems are largely used by natives for building purposes, the former for roofs and the latter for partitions and walls of houses, which, when properly constructed, are very neat-looking and durable. The top shoot makes an excellent vegetable, while the trunk, when split in two longitudinally, and the pith scooped out, is used as a boat to transport the raw sago which has been extracted from it. The bark, when taken off, makes excellent fuel, and an enterprising Chinaman, who employs an engine for rasping sago logs, uses this as a substitute for firewood.

The sago trade between Mempakul and Labuan is carried on by

native schooners of about forty tons, which ply regularly, and in fair weather are able to make a trip every two days.

The following are the figures recorded in the returns at Mempakul of the sago shipped to Labuan since January, 1890 :

	<i>Sago Flour.</i>	<i>Raw Sago.</i>
1890	\$23,483.72	\$10,350.32
1891	24,826.67	18,560.20
1892	101,327.06	25,304.59
1893	119,092.70	25,034.24

The latter portion of the year is generally the busiest, as the rains assist in the transport of the raw material from streams which may have become too shallow during the dry weather.

The present price of sago flour at Singapore is \$2.55 per pikul. The Chinese traders buy the raw material at from \$1 to \$1.20 per pikul, according to the market price at Singapore, and, after allowing for the cleaning of the raw sago and washing it in the factories, there remains a profit of at least 50 cents per pikul to the Chinese manufacturers. The freight from Labuan to Singapore at present is 22 cents per bag of 115 catties = 150 lbs. A royalty of 6 cents per pikul is charged on sago flour exported from Province Dent to Labuan, when the Singapore price is below \$2.50, and 8 cents when above that sum. On raw sago a royalty of 8 cents is charged to protect the sago factories. The sago trade is increasing rapidly on the Borneo Coast, and at the present time over three-fourths of the flour and raw sago exported from and imported into Labuan comes from British North Borneo ports.

(Signed), J. G. G. WHEATLEY,
Magistrate, Province Dent.

MEMPAKUL, September 15, 1894.

Seeds without Fertilization.—Some years ago, Mr. John Smith, the Curator of the Kew Gardens, had a plant of the Euphorbia family, which was wholly pistillate—not another plant was known in Europe—and yet it produced perfect seeds. On this account, the plant being of a new genus, he named it "*Calebogyne*," a Greek term representing this curious behavior. Peculiarities of this kind seem incomprehensible, and yet they are generally believed in by scientific men. Mr. David H. Day, of Buffalo, writes that he is quite sure a pistillate plant he has of *Thalictrum Fendleri* produces seeds without being pollenized, and the writer of this paragraph, one year, cut off all the pollen-bearing flowers of the castor-oil plant, so that not a particle of pollen perfected, and yet the plant produced its complement of seeds. The whole experiment, however, can be so easily repeated, that it is much better to consider this result as only a possibility until further experiments have been made.—*Meehan's Monthly for April, 1895.*

EDITORIAL.

PHARMACEUTICAL DEGREES.

It was announced in the April number of this JOURNAL, that the Philadelphia College of Pharmacy had decided to establish a three years' course of study, instead of the present one of two years; and, in order to compensate for this additional study, it had been decided to confer on graduates, who have had four years' practical experience in the drug business, the degree of Doctor of Pharmacy.

There have always been in attendance at the College a number of students, who, for various reasons, have not taken store experience because of their intention to study medicine, or to take positions in manufacturing laboratories. It has also been decided to grant a degree to the individuals of this class. The title conferred on them for three years' attendance at the College, and the passing of satisfactory examinations, will be that of Pharmaceutical Chemist.

The degree of Graduate in Pharmacy will not be awarded after the graduation of the class now in course.

The reasons for conferring the degree of Doctor of Pharmacy have already been clearly set forth by Professor Remington in the paper referred to, and further argument seems unnecessary at the present time.

As was anticipated, some opposing criticism has already appeared in the medical press. It is natural that certain elements in the medical profession should be jealous of encroachment by the pharmacist, even if it is only in the field of titles. They may be reminded, however, that the candidate for the degree of Doctor of Pharmacy will have given one year more to the study of his profession than was until a comparatively recent period required of the candidate for the degree of Doctor of Medicine.

It has not been so long since two years of study in our leading medical schools sufficed to procure the medical degree. Is it reasonable to expect the pharmaceutical student to be content with simply the statement that he is a graduate in pharmacy after he has devoted three years to the study of his profession?

The Philadelphia College of Pharmacy has not taken this step to gain an advantage over other colleges of pharmacy, for they can, and probably will, be conferring the same degree within two years, but because it has been evident for some time that the pharmaceutical profession of the United States demands something more than the title of Graduate in Pharmacy.

The editor of the *Pharmaceutische Rundschau*, of New York, has ventured to assume the rôle of a prophet, and to predict the calamities which will befall the two professions of pharmacy and medicine if the degree of Doctor of Pharmacy shall be conferred.

The editor of the *Medical News*, of Philadelphia, echoes these prophetic arguments, and supplements them with the following wail: "The Doctors of Divinity have largely gone into the patent-medicine business in opposition to physicians; and now if every druggist also turns doctor, what in the world may the medical men do, and what may they be called?" So far as his deploring the opposition of the D.D. is concerned, we can only say that, in his sweeping arraignment of the clergyman, the editor probably did not intend to make it appear that the physician is in the patent-medicine business, too, but it

is unfortunate that the latter often, though unwittingly serves as a cat's paw for the patent-medicine manufacturer by prescribing his remedies. What he will do when every druggist turns doctor is too hard a question for us to answer, as we do not possess the necessary faculty of seeing into the future, but we suggest that he keep out of the clutches of the patent-medicine manufacturer and that he confine himself to the legitimate practice of medicine.

THE AMERICAN PHARMACY FAIR.

The American Pharmacy Fair was held at Boston, from the 1st to the 25th of May. It has been announced as the first of the kind in America. While it was not the first pharmaceutical exhibition held in this country, we agree that it was the first of its kind.

It failed in a few important particulars to represent American pharmacy. In the first place there was but one retail drug store exhibited, and that was by a "store-fixtured" firm in the interest of the fixtures, so that real pharmacy may be said to have been conspicuous by its absence.

There were very few exhibits of crude drugs or chemicals.

A few firms exhibited manufactured pharmaceutical products, and these products were not of the kind to be of educational value, many of them being simply for this or that disease.

The most creditable exhibit was that of the Massachusetts College of Pharmacy, which displayed a sample of every preparation in the U. S. Pharmacopœia and the National Formulary—over 1,600 in all; these were made by students of the Institution.

Had the fakir and the nostrum-manufacturer been excluded, the omissions and shortcomings might have been overlooked, but with some one offering you a cure at every turn for every disease, from dyspepsia to delirium, it became unbearable. We regret that the words "American Pharmacy" were associated with the undertaking, and we are not surprised to learn that its doors were closed ten days before the time advertised for this to take place. Lack of funds was given as the immediate cause of the disaster.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

MISSOURI BOTANICAL GARDEN. Sixth Annual Report. St. Louis, Mo. 1895.

Much valuable space is gained for more scientific matters in the Sixth Annual Report by the omission of the section consisting of "Anniversary Publications," comprising the annual flower sermon and the proceedings at the two annual banquets; the report of the Director, Dr. William Trelease, containing all that it is considered necessary to state concerning these matters which are of local or temporary interest.

In addition to the reports of the officers of the Board and the Director, the volume contains 100 pages devoted to the following scientific papers:

Revision of the North American Species of *Sagittaria* and *Lophotocarpus*, by Jared G. Smith.

Leitneria Floridana, by William Trelease.

Studies on the Dissemination and Leaf Reflexion of *Yucca aloifolia* and other species, by Herbert J. Webber.

Notes and Observations on New or Little Known Species, by Jared G. Smith.

Notes on the Mound Flora of Atchison County, Missouri, by B. F. Bush.

Eighteen full-page illustrations adorn the work and add to its interest and value. The whole book is especially valuable to botanists and horticulturists, although any intelligent person can read it with profit.

BIOGRAPHICAL SKETCH OF DR. J. BERNARD BRINTON (with Portrait). Reprinted from the *Bulletin of the Torrey Botanical Club*, Vol. 22, No. 3, March, 1895.

The subject of this sketch excelled in several departments of science, but his greatest success was attained in the field of botany. He was a member of the Academy of Natural Sciences, of the Torrey Botanical Club and of the Philadelphia Botanical Club, which he founded in 1892. He was an extensive collector, and possessed an herbarium of large proportions, which he had labeled and preserved with the most scrupulous care.

Dr. Brinton was born near Waynesburg, Chester County, Pa., August 16, 1835, and died in Philadelphia, December 6, 1894.

THE EXTRA PHARMACOPŒIA. By William Martindale, F.C.S. Eighth Edition. Pp. 584. London. H. K. Lewis. 1895.

In the anticipation of the production of a new British Pharmacopœia, Mr. Martindale has for some time been engaged in investigating the claims of many new drugs and preparations for official recognition. The work, therefore, includes notes on the proposed revision, and through the analysis of 25,500 prescriptions by the author, lists have been compiled of unofficial preparations which, seem to require admission, and of official preparations which, not being in demand, might be deleted.

The Extra Pharmacopœia, in the eight editions it has now passed through, has attained a well-deserved reputation for a concise treatment of most unofficial drugs and preparations; at the same time it includes some official substances. The author very appropriately remarks in the preface: "A tangent of an important character has been projected in the direction of preparations from the animal kingdom, which till recently had been almost entirely neglected as curative agents. We have, therefore, inserted a special chapter on Antitoxins, Serums and Lymphs, and on Animal Glands and Tissues and their preparations."

Some further investigations have been included, notably the observations on "A. C. E." (Alcohol, Chloroform, Ether) mixture (see paper by Mr. Joseph W. England on page 328 of this issue). The latest researches on the alkaloids of Aconite and Ipecacuanha, including Aconitine, Emetine and Cephaëline, which will have an important bearing on therapeutics, have been added.

As attested by its eight editions, the book is a valuable one for reference, not only by those using the British Pharmacopœia, but by every one who prescribes or dispenses medicines.

The medical references and therapeutic index of diseases and symptoms have, as usual, been contributed by W. Wynn Westcott.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION

The next meeting of this Association will be held at Eagles Mere, Pa., on Tuesday, June 18, 1895. Detailed information can be obtained by addressing J. A. Miller, Harrisburg, Pa.

THE AMERICAN JOURNAL OF PHARMACY

JULY, 1895.

A REVIEW OF THE CONSTITUENTS OF WHITE AND BLACK MUSTARD SEED. —

BY L. E. SAYRE.

If one will take the trouble to review the chemical constituents of white and black mustard, he cannot fail to be impressed by the fact that we have in these two plants of the *Cruciferae* a most interesting chemical study. Just why these two plants of the same order, of the same genus, indigenous to almost the same countries, growing in similar soil, and in the same climate—why these two plants, with so many conditions and circumstances in common, should elaborate different chemical substances in fructification, and then arrange them in ways so similar, and what the significance of this peculiar fact is, are questions which are beyond our understanding. It is my purpose in this review to compare the chemical constituents of the two seeds, and to bring out, if possible, any other points of interest that may be obtained from a review of the work that has been done by others.

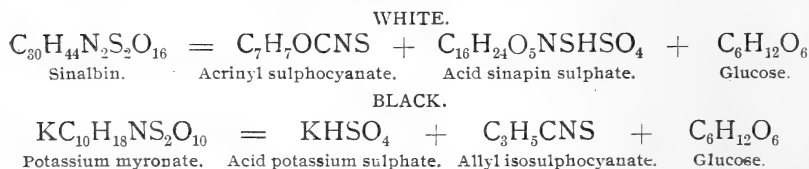
Not many months ago I had occasion to write, for publication, an article which had to do with the subject of mustards. From an oversight on my part, I failed to draw a distinction between the chemical constitution of the two seeds, and when my attention was called to the mistake by a friend, I tried to ascertain how it was that the error had crept into the manuscript. This gave me an incentive to look further into the subject, and to study some of the original articles by such investigators as Will and Laubenheimer. For the compilation of the work done by these chemists, as published in Liebig's *Annalen*, I am indebted to Prof. J. U. Lloyd, who has this valuable work in his library. And for the laboratory work

here I am indebted to Mr. Edward F. Schopflin, of the graduating class of the School of Pharmacy of the University of Kansas.

Mustard was known and used, especially for its volatile oil, many hundred years ago. But not until the early part of the nineteenth century was anything known of the chemical action taking place when water was added to ground black mustard. Will and Hörner, in 1863, established beyond a doubt that the pungent principles developed upon the addition of water were due to the decomposition which took place between a glucoside and a ferment. They made a very thorough study of the black mustard and, some years later, Will and Laubenheimer studied white mustard.

Comparing the gross characteristics of the two seeds, we find in both cases, pre-formed in the seed, a fixed oil, almost the same amount in each, the black seed containing 23 per cent. and the white 22 per cent. The two fixed oils are almost identical in composition. While the compounds that form them may vary some quantitatively, there has been found no compound in the one that has not been shown to exist in the other. In both seed are found a considerable quantity of albuminous matter, also about 19 per cent. of mucilage; but in neither case is there found any (?) starch. Both seed contain the ferment myrosin, the white seed usually containing the larger quantity. The quantity of myrosin in the black seed is quite variable, sometimes going as low as 2 per cent., and again containing as high as 18 per cent. They each yield about 4 per cent. of ash. They each contain a glucoside which resembles that of the other in very many ways, and again differ one from the other very materially in two or three ways. The glucoside sinalbin ($C_{30}H_{44}N_2S_2O_{16}$) from the white seed yields, when decomposed by myrosin, glucose, sinapin sulphate and a fixed oil, which is the sulphocyanate of acrinyl, or, chemically, the ortho-hydroxy-benzyl sulphocyanate. Sinigrin ($C_{10}H_{18}KNS_2O_{10}$), the glucoside from black mustard seed, yields glucose, potassium sulphate, and a volatile oil, allyl isosulphocyanate.

The reactions may be represented as follows:



In reviewing the literature relating to black and white mustard, the average reader is exceedingly liable to be confused and misled ; in the first place, because there exists a great similarity between the white and black mustard, and at the same time there exists a very decided difference between the two ; then also because of the ever-changing system of nomenclature in use. The glucoside from white mustard has been known under no less than four different names : sulphocyanide of sinapine, sulpho-sinapisin, sinapin, and sinalbin, and, which makes it more confusing, one of these names has been retained for the alkaloid developed from sinalbin by decomposition with myrosin. Even now sinigrin is known by two different names : sinigrin and potassium myronate ; and the pungent oil of white mustard is known by three different names, acrinyl sulphocyanate, ortho-hydroxy-benzyl sulphocyanate, and sinalbin-mustard-oil (many believing this to be a volatile oil).

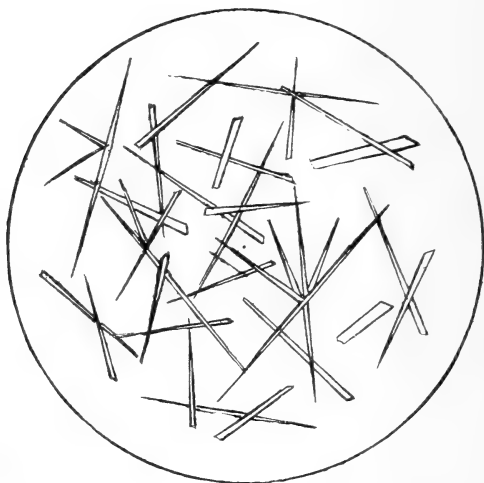
Owing to this general confusion, one has to read with the utmost care, and carefully sift from the miscellaneous mass the points which draw a sharp comparison between the two. The following comparison of their constituents will probably help make it more clear :

BLACK.		WHITE.	
Fixed oil	23 per cent.	Fixed oil	22 per cent.
Stearin,		Stearin,	
Olein,		Olein,	
Erucic acid ($C_{22}H_{42}O_2$),		Erucic acid ($C_{22}H_{42}O_2$),	
Sinapolic acid ($C_{20}H_{38}O_2$),		Sinapolic acid ($C_{20}H_{38}O_2$),	
Behenic acid ($C_{22}H_{44}O_2$),		Behenic acid ($C_{22}H_{44}O_2$),	
Mucilage	about 19 per cent.	Mucilage.	
Albuminous matter.		Albuminous matter.	
Myrosin (generally less than in white seed).		Myrosin (generally more than in black seed).	
Sinigrin ($C_{10}H_{18}KN_2S_2O_{10}$), or,		Sinalbin ($C_{30}H_{44}N_2S_2O_{16}$) :	
Potassium myronate :		Glucose ($C_6H_{12}O_6$),	} Products from Sinalbin.
Glucose ($C_6H_{12}O_6$),		Sinapine sulphate ($C_{16}H_{25}NSO_9$),	
Potassium acid sulphate ($KHSO_4$),		Ortho-hydroxy-benzyl-sulphocyanate	
Allyl-isosulpho-cyanide (C_3H_5NCS),		(fixed oil)	
volatile oil.		$C_6H_4 < \begin{matrix} OH \\ CH_2CNS \end{matrix}$	
Sinapine sulphocyanate (alkaloid)		Sinapine Sulphocyanate (alkaloid)	
($C_{16}H_{24}NO_5CNS$).			

As it would prolong this paper unduly to give the details of laboratory work in connection with the study, and as this work was designed merely for the purpose of verifying and studying the work that has been done by others, it behooves the writer to make no further reference to this than to say that the constituents of white mustard were extracted, following the process of Will and Lauenheimer, and by test-tube experiments the acrid and pungent

principles from the white and black mustard were obtained by the action of the ferment upon the glucosides. In the subjoined paragraphs a statement is made as clearly as possible as to the best methods of procedure in obtaining the principles named.

To obtain *sinigrin* from black mustard seed; reduce them to a fine powder, and express the fixed oil as completely as possible, then extract with benzene (C_6H_6) to remove the remainder. Expose the seed thus treated to the air, and allow the benzene to evaporate completely. Then re-powder and place them in three or four times their bulk of *boiling* alcohol. Boil for about thirty minutes on a water bath and evaporate to dryness; re-powder, and extract with



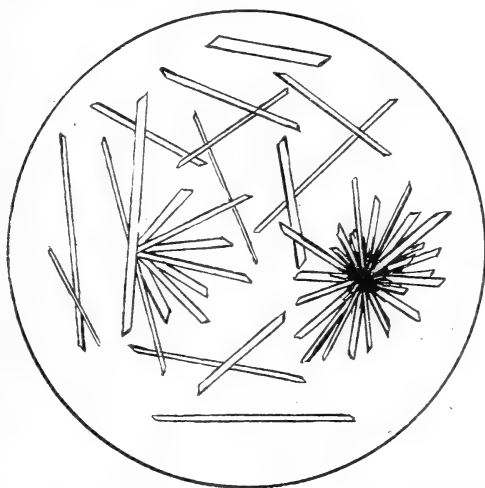
SINIGRIN. From an Alcoholic Solution.

cold water. Treat this with barium carbonate and evaporate on a water bath to dryness. Extract the residue with strong boiling alcohol and filter while *hot*. Set the solution away in a cool place for several days, and sinigrin, or potassium myronate will crystallize out in long, fine, silky needles. From aqueous solution it crystallizes in four-sided prisms. It may be purified by recrystallization from boiling alcohol.

Free myronic acid may be obtained from sinigrin by decomposing it with a concentrated solution of tartaric acid, and adding alcohol.

To obtain sinalbin from white mustard seed, powder finely, and extract the fixed oil completely with benzene (C_6H_6). Spread the

powder out and allow the benzene to evaporate. Re-powder, and place in about four times its weight of boiling alcohol. Boil for thirty minutes, adding sufficient alcohol to make up for loss by evaporation. Filter, keeping filter hot in steam-bath. Set the filtrate aside in a *cold* place for about twenty-four hours. The sinalbin separates out in a crystalline mass. Decant and preserve the liquid. Re-dissolve the residue in hot alcohol. Filter while hot and set aside to re-crystallize. Repeat the crystallization until pure, clear crystals of sinalbin are obtained. It crystallizes very similar to sinigrin in small, pearly needles, concentrically arranged.



SINAPIN SULPHATE. From an Alcoholic Solution.

When pure it is almost colorless, but shows just the faintest shade of yellow. It is sparingly soluble in cold alcohol; it requires 3.3 parts of boiling 85 per cent. alcohol to completely dissolve it. It is easily soluble in water, and insoluble in ether and carbon disulphide; its solutions are neutral. When heated, it melts, forming a yellow liquid, and, when heated still further, is decomposed, evolving fumes of disagreeable odor, and, like sinalbin itself, alkalis turn it intensely yellow, and nitric acid gives with it a blood-red color.

In the liquid preserved from above is contained sinapine-sulphocyanate. It separates out, on standing eight or ten days, in globular aggregations. The liquid may be poured off and the sinalbin

sulphocyanate partially purified by repeating the solution in alcohol and separation several times. Alkalies color it intensely yellow, and acids, if added *at once* to this solution, restore the original sulphocyanate; but if the alkaline solution be boiled and the acid added, a heavy precipitate is formed. This precipitate is *sinapinic acid*, the same which is called by Blyth, *sinapric acid*. Sulphocyanic acid is given off, and remaining in solution is a very deliquescent base, *sinkalin*, which is undoubtedly a derivative of trimethylamine, and has since been shown to be identical with *cholin*.

It might be inferred from the above that the compound is the sulphocyanate of a base composed of sinkalin and sinapinic acid, or that it is the sinapinate of a base composed of sinkalin and sulphocyanic acid. But from the experiments performed by Will on sinapine, it seems more probable that it is a base composed of sinkalin and sinapinic acid, and cannot be isolated on account of its instability. The sinapine sulphocyanate may be converted into the acid sulphate by the addition of sulphuric acid to its alcoholic solution. The acid sulphate crystallizes in beautiful, slender, monoclinic prisms, seldom large enough to be seen except under the microscope.

Myrosin may be obtained by extracting the powdered white seed with *cold* water, concentrating in vacuum below 40° C., and then precipitating with as small a quantity of strong alcohol as possible, filtering and washing the precipitate on the filter with alcohol until no red color is produced in the filtrate by the addition of ferric chloride (even after the addition of water), and no longer colored yellow by ammonia.

The work still remaining to be done on the mustard is the determination to a certainty of the nature of the alkaloid sinapine sulphocyanate, and the investigation of the nature and composition of myrosin.

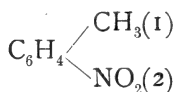
The satisfactory study of the ferments is an exceedingly difficult one, but it seems that there is no reason why we should not be able to analyze and study myrosin better than many other organic compounds that have been studied.

Professor E. C. Franklin, of the University of Kansas, suggested a synthesis of the pungent fixed oil(?) of white mustard. An attempt was made to carry this out, but owing to numerous drawbacks, such as the accidental breaking of sealed tubes containing

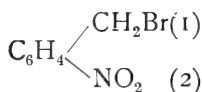
bromine and toluidene, etc., and a want of time, the work was, for the time at least, abandoned.

Professor Franklin suggests that if the composition of the pungent principle of white mustard is as reported, it may be synthesized by the following reactions:

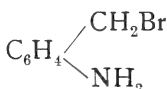
(1) Beginning with the ortho-nitro-toluidene



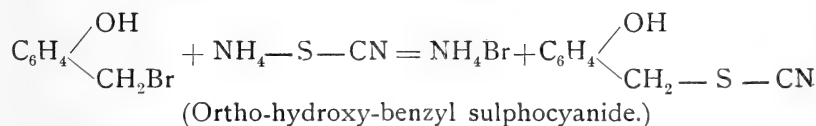
add bromine and heat to 130° to 160° in a sealed tube until the reaction is completed—probably two or three hours. The result will be ortho-nitro-benzyl bromide



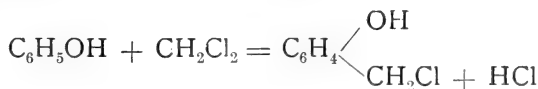
Treat this with a reducing agent ($\text{Zn} + \text{HCl}$). The result will be ortho-amido-benzyl bromide



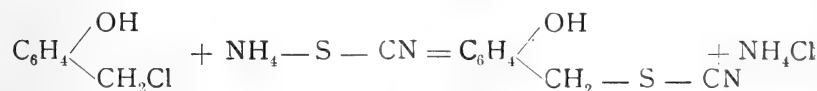
Diazotize this and boil the resulting diazo-compound with water. The resulting compound will be ortho-hydroxy-benzyl bromide. Treat this with ammonium sulphocyanate:



(2) Take carbolic acid ($\text{C}_6\text{H}_5 \cdot \text{OH}$) and treat, in the presence of aluminum chloride (pure), with dichlor methane (CH_2Cl_2):



Treat this with ammonium sulphocyanate:



THE VIOLET PERFUME.—

BY HENRY KRAEMER.

One of the large industries of the world requiring a vast expenditure of money and employing some of the most ingenious and educated of men, is the industry for the extraction of perfumes from the plants and animals yielding them. It may be further said that nothing, probably, has contributed more to the welfare and happiness of the race than those plants of pronounced odors and colors. To the rich and poor, alike, they have come at times laden with the unmistakable signs of rest and hope. By the beautiful as well as homely, they have been utilized for their power of adornment. The extent of their influence may be ascertained, possibly, when we recall that the beautiful Countess Eugenie de Montijo draped her gown with violets, "caught" the Emperor Napoleon III and mounted a throne.

There are about 170 species of violets known—but two or three species are sweet-scented, and those cultivated for their perfume are varieties of the species, *Viola odorata* Linné. The chief locality for the cultivation of the violet in large quantities is on the shores of the Mediterranean at Grasse and Cannes. The seeds of the violet are planted either in April or October in olive groves in order to protect the growing plants from either the sun in summer or the cold in winter. In from 4 to 6 weeks the flowers appear and they are then picked twice a week in the morning. In the afternoon these flowers are delivered to the factories and are at once treated for their perfume. Otherwise if the flowers are allowed to remain too long on the plant, or subsequently after picking, they lose very much of their odor. The plant is exceedingly delicate and the harvest is hence very subject to the climatic influences and Sawyer records the suffering to the extent of 75 per cent.

Commercially the perfume of violet is extracted by the cold process of "enfleurage" and subsequent solution in deodorized alcohol as an "extrait." The real "violet extrait" is very fine, but is said to be rarely obtained pure, as that retailed consists of other perfumes, chiefly that of the *Iris* rhizome. This leads to a consideration of so-called "Orris Root," which is yielded by three species of *Iris*. Formerly the rhizome from the wild plant was employed; today it is said that the cultivated rhizome is much more profitably employed.

The cultivation of the iris is not attended with difficulties as it seems to thrive either in a calcareous or damp soil. The rhizome is collected in the early spring. The flags being cut back to within a few inches of the rhizome, and another cut is made across the first tuberous formation. This portion then containing the growing young flag is replaced in the ground, which continues to grow, producing another rhizome, while the remainder of the rhizome is trimmed of its rind, cleaned and dried in the sun. The fresh rhizome—so called "Orris Root"—has an earthy smell, differing but little from the iris of our swamps. The peculiar aroma is developed during a process of drying. The maximum development is said not to be attained for at least two years, and that it even intensifies after that time. The odor of the iris rhizome is similar then to that of violets.

The iris rhizome was distilled with steam by F. A. Flückiger (1876), and he obtained in the distillate "butter of Iris," possessing the characteristic odor of Orris and consisting principally of myristic acid and a minute quantity of an essential oil, to which he claimed the entire fragrance of the root is due. He estimated the proportion of oil in the root to be not more than 1 part in 10,000.

In extracting the oil from the rhizome now they frequently add some dilute sulphuric acid with the water, the idea being to convert the starch into soluble dextrose, the oil then being readily caught up by the steam and carried into the distillate. The yield of oil by this method is greater, but the aroma is not considered to be so delicate. Ferd. Tiemann and Paul Krüger have, during the past ten years endeavored to isolate the chemical principle to which the odor of the fresh flowers of the violet and iris rhizome is due. It has been found impossible as yet to obtain sufficient of the odoriferous material from violet to ascertain whether or not it is identical with that contained in the iris rhizome. They have, however, had considerable success with the iris and have published their investigations thus far in the *Ber. d. Chem. Ges.*, xxvi., 3, p. 2675.

According to these authors, the odoriferous principle of the iris rhizome cannot be obtained directly by distillation with steam. This is due evidently to the large amount of starch contained therein, which, in some way, seems to hold the volatile substances. They, therefore, extract the root repeatedly with ether and then distil the ethereal extract with steam. As a result of the distillation

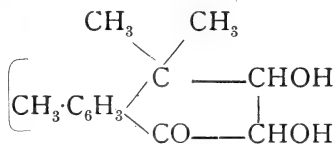
two products are obtained, the one remaining behind being a slimy mass, which, on treatment with alkali, gives myristic acid, ingenin, iridic acid and a brittle, crystallisable resin. In the distillate is the volatile portion consisting of the ethereal oil with a large amount of myristic acid and its methyl salt, oleic acid and an ester of the same, oleic aldehyde and other substances probably in the nature of alcohols that were not further studied. The ethereal solution of this mixture is shaken with a two per cent. KOH solution to remove in part the free organic acids. The remaining organic acids with the esters are further removed by repeated fractional distillation of the oil with steam. The neutral oil, obtained by this distillation treatment, is then dissolved in alcohol, and at the ordinary temperature treated with alcoholic KOH to saponify any organic esters remaining. This alcoholic solution is then poured into water, and the aqueous solution extracted with ether, and the ethereal extraction again distilled with steam. The "Irisaroma" goes over with the first distillate. This oil is then boiled with water + Ag_2O to oxidize any aldehydes present, and so remove the same. The "Irisaroma" being a ketone, is purified by forming a phenylhydrazine compound by allowing equal molecules of the "Irisketone," and phenylhydrazine to remain together for a day at the ordinary temperature, and then distilling this hydrazone mixture with steam. The "Irisketone" remains behind in combination with the phenylhydrazine as a brown oil, which is then decomposed with dilute H_2SO_4 into phenylhydrazine and the "Irisketone" or "Irisaroma," called *Irone*. This is then extracted with ether from the aqueous distillate and rectified under diminished pressure. *Irone* $\text{C}_{13}\text{H}_{20}\text{O}$ is an oil which is scarcely soluble in water, but soluble in alcohol, ether, chloroform, benzol and ligroin. B. P. 144° under a pressure of 16 mm. Specific gravity 0.939 at 20° . Index of refraction $n_D = 1.50113$. It polarizes light to the right and in a dcm. tube to the extent of 40° . The smell of pure irone is sharp and in the concentrated condition quite unlike that of violets. But when diluted with alcohol and exposed to the air the odor resembles that of the natural flowers.

Ironoxime— $\text{C}_{13}\text{H}_{20}\text{NOH}$. The oxime is generally obtained as an oil soluble in alcohol ether, benzol, chloroform and ligroin. Once crystals were obtained, and some of these were subsequently used in obtaining, with great difficulty, however, further crystals from a ligroin solution.

Constitution of Irone.—On treatment with NaClO it yields CHCl_3 , showing that it is methylketone of the formula $\text{C}_{11}\text{H}_{17}\cdot\text{Co}\cdot\text{CH}_3$.

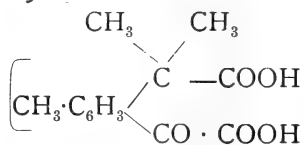
Irene, $\text{C}_{13}\text{H}_{18}$.—On treatment of irone with $\text{HI} + \text{P}$ it loses a molecule of H_2O , and forms a colorless oil Irene, B.P. $113^\circ\text{--}115^\circ$ (9 mm). Specific gravity, 0.9402 at 20° . Index of refraction, $n_D = 1.5274$. It dissolves in concentrated H_2SO_4 , decolorizes a solution of Br in acetic acid, does not combine with picric acid, is gradually converted by air into a resin, burns with a sooty ("rus-sender") flame. When carefully oxidized, Irene yields a series of compounds which throw much light on the constitution of both Irene and Irone.

(a) *Trioxydehydroirene* :



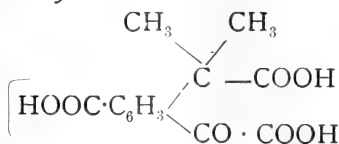
Produced on the addition of Irene to a chromic acid in acetic acid solution. It crystallizes from benzol in highly refractive rhombohedra of M. P., $154^\circ\text{--}155^\circ$ and possesses feebly acid properties.

(b) *Iregenondicarboxylic Acid* :



This acid is yielded by the oxidation of trioxydehydroirene by alkaline $\text{K}_2\text{Mn}_2\text{O}_8$. It crystallizes from hot water in either needles or prisms of M. P. 227° .

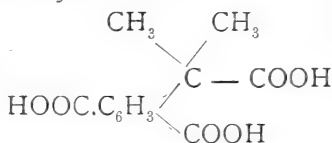
(c) *Iregontricarboxylic Acid* :



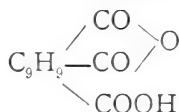
This is formed upon the further oxidation of the foregoing acid, and crystallizes from water at 5° in prisms (granular) holding water of crystallization, which it loses at 110° , and on heating to 227°

melts without decomposition. Its trimethyl ester forms compact crystals of M. P. 127° – 128° .

(d) *Ioniregenetricarboxylic Acid*:

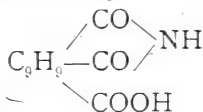


This acid is always produced as the final oxidation product of Irene, when this operation is carried out at first by gentle and then by more powerful oxidizing agents. It crystallizes in white needles, and is slightly soluble in cold water, alcohol or ether, but is soluble in these reagents when they are hot, and is not dissolved by benzol or ligroin. At 150° it loses a molecule of water, and is converted into the anhydride. The salts of the acid crystallize well. The acid is stable, and is not altered by oxidizing agents or by warm concentrated H_2SO_4 . The anhydride



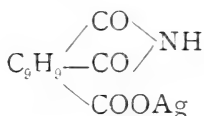
crystallizes from benzol in plates of M. P. 214° , and may be distilled without decomposition. The trimethyl ester of the acid crystallizes from warm ligroin in colorless needles of M. P. 93° .

Imid acid of Ioniregenetricarboxylic Acid:

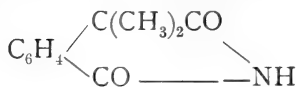


This imid acid is produced when the NH_4 salt of ioniregenetricarboxylic acid is dry, distilled in a current of CO_2 gas. It is a white crystalline powder, which is insoluble in the usual solvents, M. P. over 300° , and boils a few degrees higher than this.

Its Ag salt

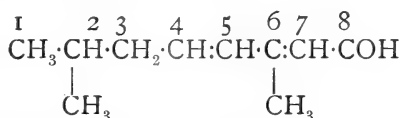


is a white powder which, when heated in a current of CO_2 , yields the imid of dimethylhomophthalic acid



previously prepared by Gabriel.

Synthetical Researches.—The authors made a series of synthetical researches in order to throw further light on the constitution of Irone and Irene. They started with geranial (called by Dodge, citriodor-aldehyde), also called citral. This has been shown by Semmler to have the constitution



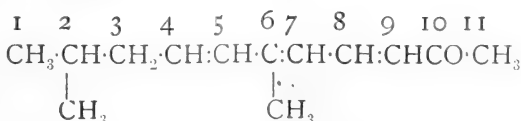
for when treated with KHSO_4 it yields cymol and with HI, (p) isopropylmethylbenzol (cymol) much easier. This geranial is condensed with acetone and yields *Pseudionone* as follows: (Erchmann, p. 173). In a stoppered flask (1 1/2 L) are added 65 cc. acetone; 50 cc. geranial, and 1 L of cold saturated baryta water. Shake this mixture thoroughly and allow to stand for several days. The products of the reaction are removed with ether, the ether evaporated and the residue distilled under diminished pressure. That which distils at $138^\circ\text{--}155^\circ$ (12 mm) is preserved. From this product the unattacked citral, acetone and other condensation products are removed from the *Pseudionon* with steam distillation. The residual oil is again fractionated and that fraction distilling at $143^\circ\text{--}145^\circ$ (12 mm) is pure *Pseudionon*.

The products of reaction are:

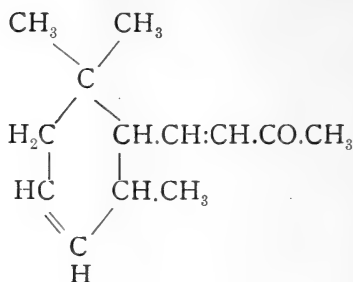


Pseudionon is a clear, colorless oil, B. P. $143^\circ\text{--}145^\circ$ (12 mm.); sp. gr., 0.9044; index of refraction, $n_D = 1.5275$; odor, characteristic and prominent. Its phenylhydrazine and oxime compounds are thick oils. It does not combine with NaHSO_3 . It is changed by alkalies and strong acids into resinous products. With dilute acids, changed to Ionon.

Pseudionon formula:



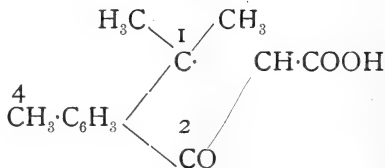
Ionon formula :



When Pseudionon is treated with dilute minerals, it is changed into an isomer of lower B. P., etc. To this end the following mixture is heated on an oil bath at the boiling point; Pseudionon, 20 parts; water, 100 parts; H_2SO_4 , 2.5 parts; glycerin, 100 parts. When cold, extract with ether. Evaporate the ether, and fractionally distil the oil remaining, under diminished pressure. That portion distilling at $125^\circ\text{--}135^\circ$ (12 mm.) is preserved and purified, either by fractional distillation again, or in the same manner as *Irone*. Pure *Ionon* has B. P. $126^\circ\text{--}128^\circ$ (12 mm.); sp. gr., 0.9351 at 20° ; refractive index, $n_D=1.507$. It is a colorless liquid, soluble in alcohol, ether, benzol and chloroform. It possesses an odor similar to the fresh flowers of violets, and resembles that of the vine blossom. When heated with $\text{HI}+\text{P}$, it loses H_2O and yields *Ionene*, $\text{C}_{13}\text{H}_{18}$, which boils at $106^\circ\text{--}107^\circ$ (10 mm.); sp. gr., 0.9338, and refractive index, $n_D=1.5244$. It resembles *Irene* very closely, and has the property of a terpene. It is soluble in alcohol, ether, benzol and chloroform.

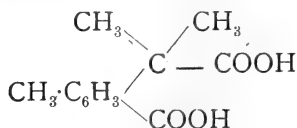
Ionene, on cautious oxidation with chromic acid, yields a mixture of the following compounds, which can be separated by means of their calcium salts:

(a) *Ionogenogonic Acid*,



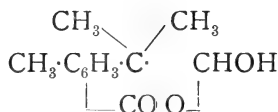
On crystallization from water it yields white needles, M. P. 237° . Soluble in alcohol, benzol and chloroform.

(b) *Ionegenondicarboxylic Acid*,

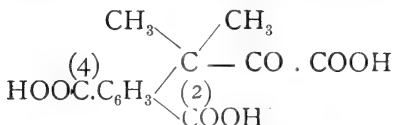


On crystallization from dilute alcohol forms clear vitreous prisms with difficulty soluble in hot water; soluble in ether, alcohol, acetic ether, chloroform and boiling benzol. When rapidly heated it melts at 130° – 131° , but when gradually heated it melts a few degrees lower, and is converted into the anhydride which crystallizes from light petroleum ether in long, white needles, M. P. 105° . The acid is bibasic and its calcium salt when distilled with soda lime yields Cymene.

(c) *Ionegenalide*



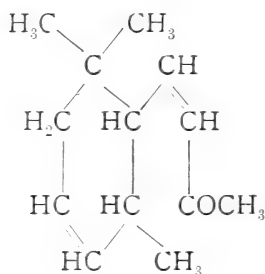
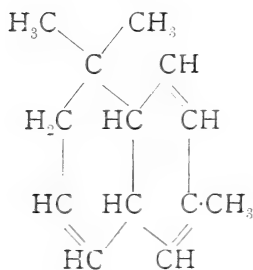
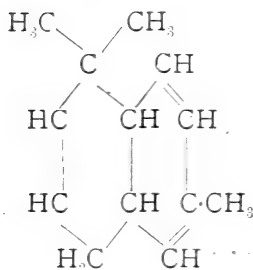
On crystallization from benzol it forms transparent plates, M. P. 175° . It possesses feeble acid properties and has the composition of the semi-aldehyde of ionegenondicarboxylic acid. It does not, however, appear to contain the aldehyde group and is, therefore, probably the aldehyde of the anhydride shown. It is readily converted by oxidation into ionegenondicarboxylic acid. Ionene on direct oxidation with $\text{K}_2\text{Mn}_2\text{O}_8$ yields *Ionegenontricarboxylic acid*,



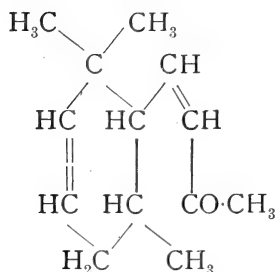
On crystallization from hot water, it forms white granular crystals, sparingly soluble in water, alcohol, ether and acetic ether; insoluble in benzol, chloroform and ligroin. It crystallizes with 2 molecules of H_2O . When rapidly heated it melts at 140° – 145° and decomposes above this temperature forming the anhydride. The final product in the oxidation of *Ionene* acid and of all intermediate oxidation products described is *Ionegenontricarboxylic acid* and is identical with that obtained from *Irene*.

CONCLUSIONS.

The isomeric hydrocarbons *Irene* and *Ionene* are shown by the nature of their oxidation products to be trimethyl derivatives of a tetrahydronaphthalene. They both contain three ethylene linkings of which two are probably on the ring which by the removal of two H atoms is converted into the benzol ring, as this is necessary to account for the terpene-like properties of the two substances. The constitution of *Ionene* follows from that of *Ionone* (being $-\text{H}_2\text{O}$), which is shown by its formation from Pseudionone by intra-molecular changes to be probably as indicated in No. 1.

Ionon.*Ionene.**Irene.*

Irone.



It will be seen from the above constitutional formula for *Irone* that it is related to *Irene* (+ H₂O) in the same manner as *Ionene* to *Ionone*. *Ionone* and *Irone* are extraordinarily alike, and can only be distinguished by much practical experience, and the authors believe that there is a great similarity in the constitution of these two compounds. It is probable that either *Irone*, *Ionone*, or some optically active isomeric substance is present in the violet blossoms, but this has not yet been decided.

Ionone and *Irone* are both without injurious effects on the animal organism, as experiments were conducted upon some dogs by Prof. Dr. F. v. Mering, and the author himself took three drops.

Other plants¹ having odors resembling the Violet, are the following :

(a) *Costus*, being the root of *Aplotaxis lappa*, Decaisne, of the N. O. Compositæ. It grows in the Northwestern Himalayas, at from 10,500 to 13,000 feet. The dried root yields 1 per cent. of a light yellow volatile oil of sp. gr. 0.982, and rotatory power in 100 mm. tube = + 15° 29'. It begins to boil at 275° C., and about half passes over below 315° when decomposition takes place (Schimmel).

(b) *Carlina gummifera*, Lesson, being the "White Chameleon" of the ancient Greeks. It possesses a root, said to be as thick as a man's thigh, and to develop a powerful violet odor when dry. It is identical with *Acarna gummifera*, Willd.; *Atractylis gummifera*, Linn.; and *Cincus carlinæ folio*, *Gummifer acanleatus*, Tourn.

(c) *Myall wood*, being the wood of *Acacia homalophylla*, whose habitat is Australia, and is said to be fragrant, so long as the wood is not polished.

¹ Sawyer, in "Odographia."

(d) *Tritelia uniflora*, of N. O. Liliacæ; habitat, Buenos Ayres; flowers.

(e) *Deudrobium heterocarpum*, the flowers of an orchid.

(f) *Oncidium inosmum*, the flowers of an orchid.

(g) *Geonoma pamila*, N. O. Palmeæ; habitat, tropics of the Western Continent. The violet odor emanates from the young green parts.

(h) Many acacias develop the odor of Cassie, which is considered an approach to the violet, as: *A. farnesiana*, Willd.; *A. bertoloni*; *A. lophantha*, *A. dealbata*, *A. pycnantha*, *A. suaveolens*, *A. odoratissima*, Willd.; *A. latronum*, Willd.; and *A. lomatocarpa*, DeCandolle.

STRUCTURE OF OUR HEMLOCK BARKS.—

BY EDSON S. BASTIN.

Only five species of the genus *Tsuga* are known; two of these belong to Eastern Asia, one, *Tsuga Canadensis*, Carrière, is the common hemlock spruce of the Eastern United States; and the other two, *Tsuga Mertensiana*, Carrière, and *Tsuga Pattoniana*, Brewer and Watson, are natives of the Pacific Coast of North America. All are trees of large size and graceful habit, and the first four are very closely allied, being so similar in appearance that they are with difficulty distinguished, while the fifth, *Tsuga Pattoniana*, is somewhat aberrant in its characters, approaching more closely the pines and spruces in its structure.

Tsuga Canadensis is an abundant species in many portions of the Eastern United States and Canada, ranging in its habitat from Nova Scotia to Delaware on the east, extending southward along the Alleghanies to Alabama, and westward along the northern ranges of States and the Canadian border to Minnesota. It is easily distinguished from the coniferous trees with which it is associated, by its small cones, one-half or two-thirds of an inch long, pendulous at the ends of the branches; by the slender, spreading branchlets which have crowded apparently two-ranked leaves along their sides; and by the distinctly petiolate, flattened, linear, denticulate leaves, which are green above and glaucous beneath, and provided with a single resin duct on their dorsal surface. Its trunk is extensively employed for lumber and its bark for tanning purposes. Its pitch, also, which is extracted from the old bark by boiling, is employed

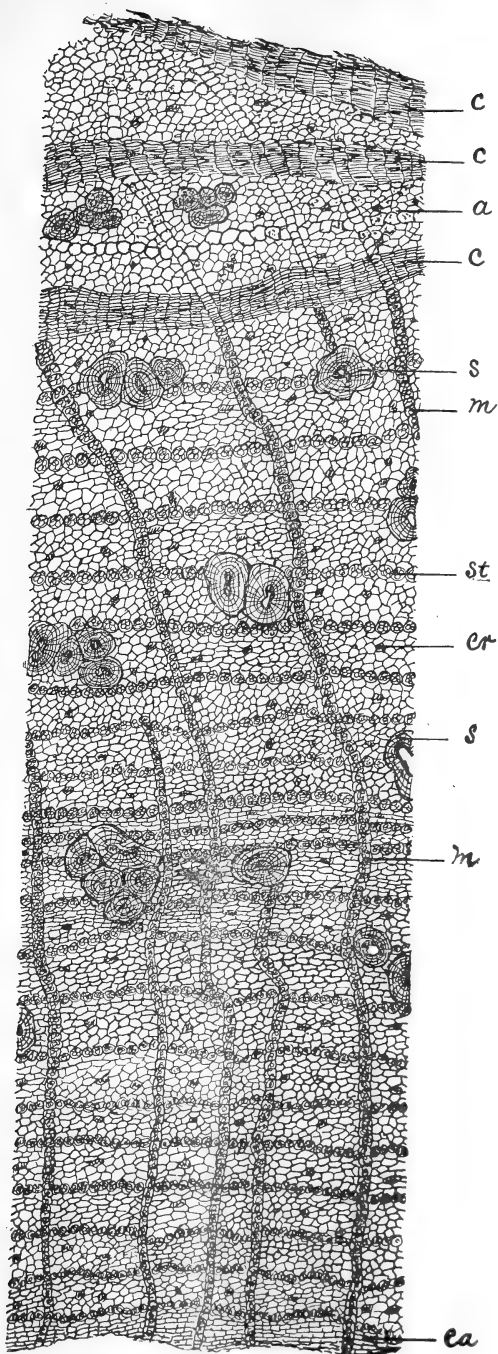


FIG. 1.

in medicine for the same purpose as Burgundy pitch. *Tsuga Mertensiana* occurs on the Pacific Coast from the vicinity of San Francisco northward to Alaska. While very similar in appearance to our Eastern species, it is, when fully developed, a tree of much larger size, sometimes attaining a height of 200 feet. It is also straighter-grained, and has a redder and usually thicker bark; but the most distinctive difference, perhaps, is in the fruits and seeds, the scales of the cones being more elongated and the wings of the

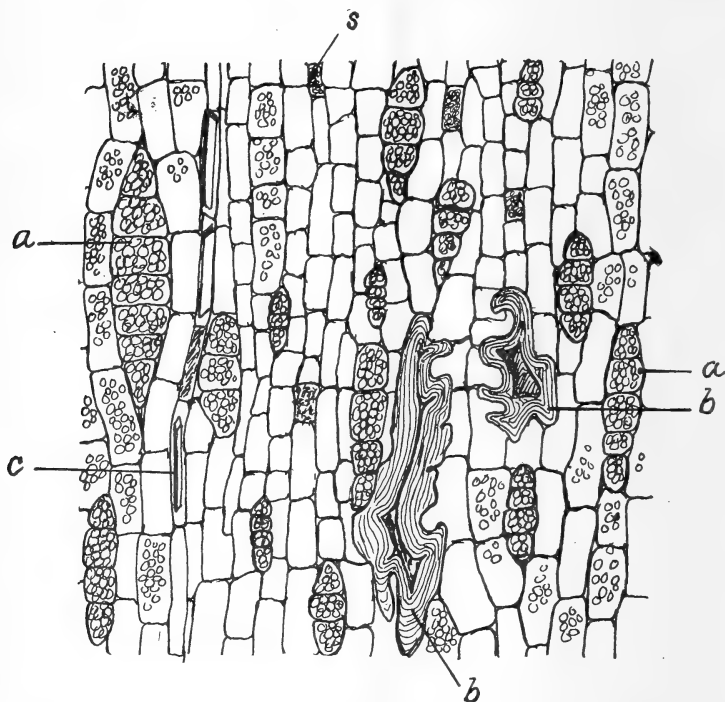


FIG. 2.

seeds being relatively longer and straighter. The wood and bark, like those of our Eastern species, are used for lumber and tanning purposes, respectively, but whether or not any commercial use is made of the pitch certainly obtainable from the bark, the writer is not informed.

The barks of these two species are the only ones the writer has examined microscopically. The barks show, as might have been expected, a great similarity in structure, though there appear to be

some characters which we may rely on for distinguishing them. In both, cork formation begins early, and in all cases where the bark has been taken from stems more than a few inches in diameter, the secondary cork-formations have invaded the inner layer of the bark, and bands of cork will be observed crossing at various angles the medullary rays. The cork in both is colored a deep purple, and this coloring matter is bleached out only with difficulty, even by Labarraque's solution. This coloring matter appears to differ in composition from the reddish-brown coloring matter found in the tissues between the bands of cork, for not only is the color a different shade of red, but it bleaches more readily. Tests for tannin show that in both species, also, the white or colorless younger portions of the bark contain little of it, while the older portions, particularly the dead sieve and parenchyma tissues between the bands of secondary cork, are exceedingly rich in it. Stone cells of large size and often quite irregular shape occur, either isolated or clustered in

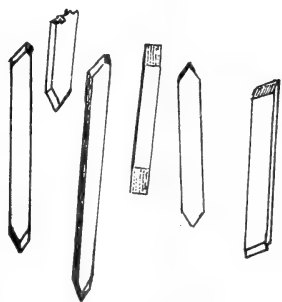


FIG. 3.

groups of several or many, throughout all except the youngest portions of the inner bark. They are quite numerous, but are distributed without apparent order. They are marked with numerous very fine pore-canals, and very numerous and fine concentric lines. Abundance of starch was found in the bark of *Tsuga Canadensis*. The medullary ray cells and the tangential rows of large parenchyma cells, which occur at frequent and regular intervals in the inner bark, were found to be especially rich in it; but, strange to say, no starch was observable in the bark of *Tsuga Mertensiana*, although there were a similar structure and arrangement of medullary ray-cells and there were the tangential rows of large parenchyma cells, the same

as in the other species. The very close structural resemblance of the barks, and the very intimate relationship of the two species in habit as well as in structure, suggest that the presence of starch in the one and its absence in the other was only a seasonal differ-

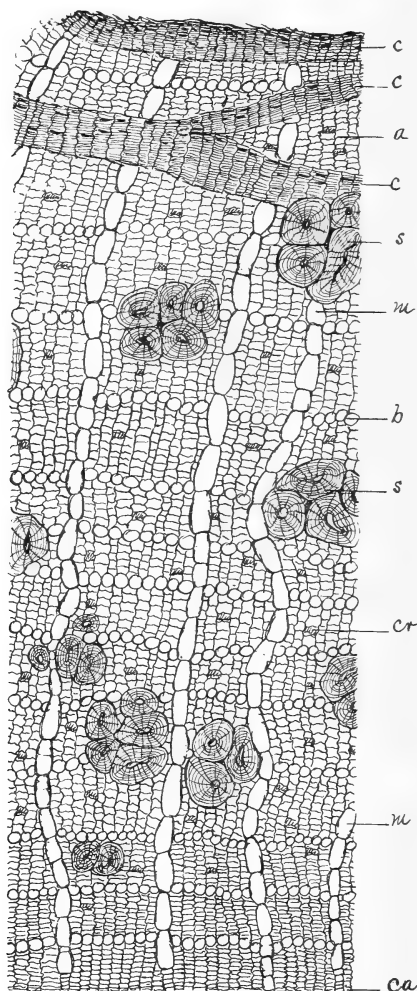


FIG. 4.

ence. But this is a point which requires further investigation. The medullary rays in both barks are composed of single rows of cells, and these are radially elongated and of large size as compared with

those of adjacent tissues; but those of *Tsuga Mertensiana* are, on the average, larger, and the rays in this species, as seen in a longitudinal-tangential section are composed, on the average, of a larger number of cells. These differences in the medullary rays are perhaps the most constant ones between the two barks.

Both barks contain abundance of crystals of oxalate of calcium. These are mostly in the form of long prisms, and are contained in

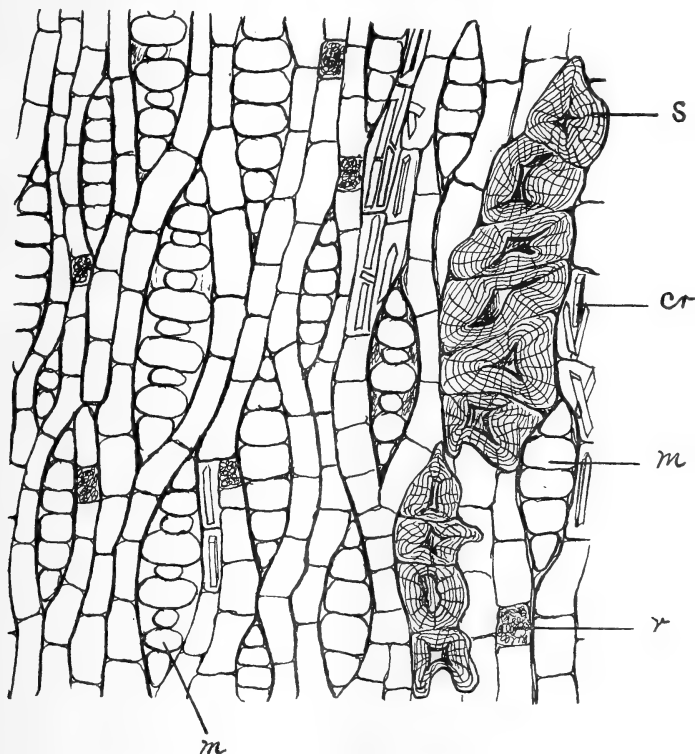


FIG. 5.

rows of elongated cells of narrow diameter, which traverse the bark in the direction of its length. The crystals are frequently associated in the containing cells with resinous and coloring matters. In form and arrangement they do not differ in the two barks, but appear to be rather more abundant in the Pacific Coast species.

Oleo-resin cells appear to be about equally abundant in the two species. Those that do not also contain crystals are isolated or in

rows of two or three, and the cells are shorter and broader than the crystal cells, though they are not usually so large as the parenchyma cells with which they are associated. They are scattered without apparent order through the inner bark. Besides the oleo-resin cells proper, just described, oleo-resin occurs in many cells not especially devoted to secretions. This is particularly true of the cells in the older portions of the bark.

DESCRIPTION OF FIGURES.

Fig. 1.—Small portion of cross-section of bark of *Tsuga Canadensis*, magnified about 50 diameters. *c, c, c*, secondary cork formation; *a*, dead phloem tissues rich in coloring, resin and tannic matters; *s, s*, stone cells; *m, m*, medullary rays; *cr*, crystal cell; *ca*, cambium.

Fig. 2.—Small portion of longitudinal-tangential section of the inner bark of *Tsuga Canadensis*, magnified about 75 diameters. *a, a*, medullary rays, the cells containing much starch; *b, b*, stone cells; *c*, row of cells containing crystals of calcium oxalate; *s*, cell containing oleo-resinous secretion.

Fig. 3.—A few of the crystals magnified 230 diameters.

Fig. 4.—Small portion of cross-section of bark of *Tsuga Mertensiana*, magnified about 50 diameters. *c, c, c*, bands of secondary cork; *a*, intervening dead tissues composed of sieve and parenchymatous elements, and like the other species, rich in tannic, resinous and coloring matters; *s, s*, groups of stone cells; *m, m*, relatively large, fusiform medullary-ray cells; *b*, band of large parenchymatous cells; *cr*, crystal cell; *ca*, cambium cells.

Fig. 5.—Small portion of longitudinal-tangential section of bark of *Tsuga Mertensiana*, magnified about 75 diameters. *s*, cluster of stone cells; *cr*, crystals of calcium oxalate; *m, m*, medullary rays; *r*, oleo-resin cell.

SYRUP OF FERROUS IODIDE. —

BY CHARLES F. CARTER, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 143.

The United States Pharmacopœia designates syrup of ferrous iodide as "a syrupy liquid, containing about 10 per cent., by weight, of Ferrous Iodide [$\text{FeI}_2 = 308.94$], or about 13.4 gm. in 100 c.c."

This preparation has always been considered as tedious to make, and also as difficult to maintain in a perfect state, on account of the unstable character of the ferrous compound, which is prone to decompose with the liberation of iodine. To guard against the presence of free iodine, the Pharmacopœia orders that, to be official, a syrup should not show a blue color when it is mixed with a small quantity of starch test solution.

With the idea of ascertaining the condition of the article as supplied to the retail trade, by manufacturing firms, ten samples were procured and examined in regard to both free iodine and amount of ferrous iodide contained.

Some of the samples were obtained directly from the producers; the others were bought from retail pharmacists.

That a comparison of the results might be made with those obtained from a product of the official process, the author prepared a sample by this means. It possessed the standard pale green color.

The test with starch was employed to detect the presence of free iodine. The content of ferrous iodide in the samples was determined by the official method, which consists of completely precipitating the iodide, in the presence of nitric acid, by the addition in excess of a known volume of decinormal silver nitrate volumetric solution, and of subsequent titration of the excess of silver in the known volume with a decinormal potassium sulphocyanate volumetric solution.

The estimation is ordered to be performed in the presence of ferric ammonium sulphate, which will indicate, by the production of a red color of ferric sulphocyanate, upon the continued addition of the potassium sulphocyanate solution, the complete precipitation of the excess of silver.

In adjusting the strength of the potassium sulphocyanate solution, by titration against decinormal silver nitrate volumetric solution, the Pharmacopœia directs .5 c.c. of ferric ammonium sulphate test solution to be used as the indicator, whereas, in the estimation of ferrous iodide in the official syrup, it orders 5 c.c. of the same test solution.

Tentative experiments having shown that the results obtained when the smaller volume was used were as uniform as those afforded in the presence of the larger volume, the smaller amount was adopted, for the reason that the solution of potassium sulphocyanate was standardized by its aid.

The following results show about one-half of the syrups of ferrous iodide placed on the market by manufacturing pharmacists to be of good quality.

The percentage results were calculated from the amount of decinormal potassium sulphocyanate volumetric solution over 1 c.c.

required to completely precipitate the silver; each c.c. in excess of this amount, which is prescribed by the Pharmacopœia, denotes a deficiency of 1 per cent. of ferrous iodide.

Number of Sample.	Location of Manufacturer.	Color.	Free Iodine.	Percentage of FeI_2 .
1	Boston.	Greenish-brown	Present in small amount	10
2	Baltimore.	Pale green; later, brownish-green.	Present.	10
3	Philadelphia.	Pale greenish-yellow.	None.	8.6
4	Indianapolis.	Pale green.	None.	10
5	Detroit.	Pale green.	None.	10
6	Philadelphia.	Pale green.	None.	7.5
7	Philadelphia.	Pale green.	None.	10
8	Philadelphia.	Brown.	Present in large quantity	5.1
9	Philadelphia.	Greenish brown.	Present.	6.8
10	Detroit.	Pale green.	None.	10
11	Own make—Philadelphia	Pale green.	None.	10

The experience of the author leads him to believe that the present official process, when conducted with the proper care, will furnish a syrup of good quality. In conclusion, he would recommend every one who makes or uses the preparation to test it, according to the Pharmacopœia, for both free iodine and the amount of ferrous iodide.

BENZIN.

BY WILSON C. McCLOSKEY, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy, No. 144.

After defining benzin as “a purified distillate from American petroleum, consisting of hydrocarbons, chiefly of the marsh-gas series [C_5H_{12} , C_6H_{14} , and homologous compounds],” the United States Pharmacopœia describes it as “a transparent, colorless, diffusive liquid, of a strong, characteristic odor, slightly resembling that of petroleum, but much less disagreeable, and having a neutral reaction.” The same authority assigns to benzin a specific gravity of .670 to .675 at 15°C ., and a boiling point of 50° to 60° Centigrade.

To permit the purified distillate to contain hydrocarbons having more than six carbon atoms in the molecule is certainly to afford it a ripe opportunity to deviate from the stringent official requirements in specific gravity and boiling point.

The existence of such a deviation must surely have been suspected by every pharmacist who has noticed the odor of the benzin usually handled by the trade.

In order to determine the extent of this variation, the writer examined samples of benzin which were purchased at eighteen retail pharmacies and at five paint stores, all of which were located in Philadelphia.

All of the samples were transparent and colorless.

The odors were noted from equal volumes of the samples contained in vessels of the same capacity. When examining the table of results, the reader should understand the word "normal," when applied as the description of odor, to mean a freedom from the odor of petroleum.

The samples were all neutral to litmus paper, and water agitated with them remained neutral to the same substance.

While ascertaining this last fact, peculiar behaviors of some of the samples, when agitated with water, were noticed.

When shaken in graduated cylinders with equal volumes of water and then permitted to rest, some of the samples demonstrated their conformity to the official requirement of insolubility in water, for the two layers that separated were equal in volume. But when other samples were treated with water in this manner an increase in the volume of the lower, or water, layer was noticed; and when still other samples were subjected to this treatment the upper, or benzin, layer was found to have been increased.

These observations were first made upon volumes of 10 c.c. each of water and sample. For the purpose of observing these phenomena from larger quantities, a line of experiments was instituted in which 50 c.c. of each liquid were employed. These experiments were attended with interesting results, for in the cases of some samples a strange reversion of the solubility occurred. When the experiments were repeated to insure certainty, the same behaviors were again observed.

The specific gravities were taken at the temperatures of the samples with a Westphal balance. As the densities thus indicated were in almost all instances greater than .675, it was considered unnecessary to determine them at 15° C.

The boiling point of each sample was found by distilling a convenient quantity (22 c.c. of each lot) from a fractioning bulb. A Centigrade thermometer was inserted almost to the bottom of the bulb.

The lower temperature given in the chart was that at which the first distillate passed over, while the higher temperature was that registered at the conclusion of the distillation, or when, approaching the end, the process was proceeding very slowly.

Any liquid that refused to distil from the bulb upon prolonged application of the highest recorded temperature, was transferred to a warm dish. The residues of petroleum given in the chart were detected by this means. When a portion of each sample was boiled for a few minutes with one-fourth its volume of spirit of ammonia and a few drops of silver nitrate test solution, the ammoniacal liquids were not turned brown, thereby showing their freedom from pyrogenous products and sulphur compounds by this pharmacopoeial test. To obtain data for comparison, some kerosene was examined in the same manner as was the benzin.

The results are furnished in the chart.

SAMPLES FROM RETAIL PHARMACIES.

Number of Sample.	Odor.	Specific Gravity.	Temperature.	Boiling Point.	INTERSOLUBILITY WITH WATER.		Residue in Dish.
					10 c.c. of each.	50 c.c. of each.	
1	Normal	•6866	25°	73° — 123°	None	None	Distinctly petroleum
2	Normal	•6806	25°	72° — 133°	None	None	None
3	Slightly petroleum	•6860	25°	66° — 100°	None	None	Distinctly petroleum
4	Slightly petroleum	•6805	25°	69° — 115°	None	None	None
5	Decidedly petroleum	•6820	25°	80° — 135°	None	None	Distinctly petroleum
6	Decidedly petroleum	•6802	6'5°	55° — 96°	Water in sample 0'5 c.c.	None	None
7	Slightly petroleum	•6905	25°	80° — 115°	Water in sample slight	Water in sample 1 c.c.	None
8	Slightly petroleum	•6811	25°	67° — 121°	Water in sample slight	Water in sample 2 c.c.	Distinctly petroleum
9	Decidedly petroleum	•6886	25°	65° — 109°	Water in sample slight	Sample in water slight	Distinctly petroleum
10	Decidedly petroleum	•6889	24'5°	78° — 102°	Water in sample 1 c.c.	Sample in water slight	1 c.c. Distinctly petroleum
11	Decidedly petroleum	•7080	24'5°	94° — 120°	None	Sample in water slight	2'6 c.c. Distinctly petroleum
12	Decidedly petroleum	•6799	24'5°	64° — 120°	None	Sample in water slight	6 c.c. None
13	Strongly petroleum	•7133	24°	97° — 137'5°	None	Sample in water slight	Distinctly petroleum
14	Slightly petroleum	•7100	24'5°	87° — 131°	Water in sample slight	Water in sample 1 c.c.	None
15	Decidedly petroleum	•7270	25°	106° — 145°	None	Sample in water slight	Distinctly petroleum
16	Decidedly petroleum	•6811	25°	60° — 105°	Water in sample 4 c.c.	Sample in water slight	Distinctly petroleum
17	Decidedly petroleum	•7090	25°	89° — 120°	Sample in water 2 c.c.	Sample in water slight	Distinctly petroleum
18	Slightly petroleum	•6832	25°	68° — 115°	None	None	None

SAMPLES FROM PAINT STORES.

Number of Sample.	Odor.	Specific Gravity.	Temperature.	Boiling Point.	INTERSOLUBILITY WITH WATER.		Residue in Dish.
					10 c.c. of each.	50 c.c. of each.	
1	Slightly petroleum	·6720	26°	50° — 109°	Sample in water about 0·5 c.c.	None	None
2	Decidedly petroleum	·7122	26°	97° — 139°	Water in sample 1 c.c.	None	Distinctly petroleum
3	Slightly petroleum	·7144	26·5°	91° — 146°	Sample in water 1 c.c.	Sample in water 0·5 c.c.	Distinctly petroleum
4	Normal	·7128	27°	94° — 128°	Water in sample 0·5 c.c.	None	Slightly petroleum
5	Slightly petroleum	·7159	26·5°	93° — 123°	None	None	Black
	Petroleum (Kerosene)	·7813	27°	149° — 200°	None	None	Distinctly petroleum

SOME COMMERCIAL ALOINS.¹

BY CHARLES H. LA WALL, PH.G.

"Read not to contradict nor to believe, but to weigh and consider."

The foregoing well-known precept from Lord Bacon was forcibly recalled by the contradictory statements made in the literature upon the subject of the aloins. Of all proximate plant principles there are few, if any, that have such a wide range of physical characteristics attributed to them as have these.

The examination of a commercial sample of aloin, and the application of the requirements of the Pharmacopœia for identity and purity, led the writer of this article to consult various authors for confirmation of certain ascribed properties. Instead of enlightenment upon the subject, confusion seemed to attend every inquiry as to its physical characters, especially that of solubility. Almost every author assigned a different degree of solubility to each of the several varieties, and few of these were actually verified upon examination of a number of samples from reputable manufacturers.

These discrepancies led to a thorough review of the literature upon the subject, and a few references from different authorities are given in regard to its physical characters, together with the result of the examination of the commercial specimens, and it is hoped that with the aid of others who may be interested in the subject, researches may be carried on which will eventually produce uni-

¹ Read before the Pennsylvania Pharmaceutical Association, June, 1895.

formity and correctness in the requirements of our official guide with reference to this substance as well as numerous others.

Aloes, which is the inspissated juice of various species of Aloe (Nat. Ord. Liliaceæ), was mentioned by Celsus and Dioscorides, who lived in the first century A. D., and it was probably known for several centuries previous to this. Those persons wishing a complete history of the drug itself are referred to "Flückiger's Pharmacographia," and *Pharmaceutical Journal and Transactions*, 2d series, Vol. 10, page 106.

In 1851 a crystalline principle was isolated from Barbadoes aloes by T. and H. Smith.¹ This principle was analyzed by Dr. Stenhouse, who named it aloin, after proving it to be a neutral principle different from the previously-mentioned aloetin of Robiquet.² The discoverers of this new substance mentioned that one ounce of cold water only dissolved one grain of aloin, but that it was more soluble when warmed.

In the same year Jonathan Pareira³ mentioned the possibility of the existence of a similar principle in Socotrine aloes. Five years later T. B. Groves⁴ discovered an aloin in this variety, and the name of the previously-discovered principle was changed to Barbaloin to indicate the difference in the source of the two principles, which resembled each other in some respects, but behaved differently in their deportment with various reagents.

Still later, Nataloin and Zanaloin were discovered, the former from Natal aloes, by Professor Flückiger,⁵ in 1871, the latter by Histed, assisted by Flückiger, in the same year, from Zanzibar aloes (a variety of Socotrine aloes imported via Zanzibar). Zanaloin was afterward pronounced identical with Socaloin.

Dr. Shenstone⁶ subsequently extracted an aloin from Jafferabad aloes, which he found to be identical with Zanaloin and Socaloin. He then proposed that the confusing nomenclature of the aloins be changed; Nataloin to be applied to the principle from Natal aloes, *α*-Barbaloin to the principle from Barbadoes aloes and

¹ *Pharm. Jour. Trans.* (1), 10, page 23.

² *Jour. de Pharm.* (3), 10, 173.

³ *Pharm. Jour. Trans.* (1), 11, 439.

⁴ *Pharm. Jour. Trans.* (1), 16, 128.

⁵ *Pharm. Jour. Trans.* (3), 2, 193.

⁶ *Pharm. Jour. Trans.* (3), 13, 461.

β -Barbaloin to the similar principle existing alike in Socotrine, Zanzibar and Jafferabad aloes.

During the time of these discoveries and for some years afterward many prominent investigators instituted researches for the purpose of clearing up the confusion which seemed to exist among these similar principles and also to investigate their therapeutical activity which some writers believed to be of little or no value. Among the names of writers who accomplished much in this respect are: T. and H. Smith, Stenhouse, Groves, Flückiger, Histed, Pareira, Tilden, Dobson and Craig.

Three distinct aloins were acknowledged to exist, Nataloin, Barbaloin and Socaloin. Nataloin is seldom found in commerce, and at the last revision of the U. S. P., Barbaloin and Socaloin were given official recognition.

In 1870, W. A. Tilden¹ made a thorough investigation of the subject in which he ascertained the following facts: Aloin in pure solutions is liable only to tardy alteration; exposed to the air the solution deepens in color by absorption of oxygen; this change is hastened by the addition of a small quantity of alkali to the solution.

Preparations of aloes upon standing for a long time, lose their bitterness without sensibly impairing their therapeutical activity and, in his opinion, aloin could not be considered the active constituent of aloes, as it possessed very little action.

He was immediately contradicted by T. and H. Smith,² who contended that the dose of aloin bore a simple ratio to the dose of the drug itself and was of unvarying effect.

Dr. Wm. Craig³ in 1875, in an able article, summed up his conclusions regarding aloin in the following words:

“(1) Aloin may, by exposure to air, undergo considerable chemical change without losing its physiological activity as an active aperient.

“(2) The resin when thoroughly freed from aloin possesses no purgative properties and, therefore, cannot be the active principle of aloin.

¹ *Pharm. Jour. Trans.* (3), 1, 375.

² *Pharm. Jour. Trans.* (3), 1, 402.

³ *Am. Jour. Pharm.*, 47, 349.

"(3) The resin is not the cause of the griping which sometimes follows the administration of the drug.

"(4) Aloin is an active aperient and is, in all likelihood, the active principle of aloes."

This same author, at that time, favored its admission into the British Pharmacopœia.

Another writer upon the subject, A. P. Brown,¹ found aloin made from Barbadoes aloes to possess effects equal to the same dose of the drug, and also found that the extract made from the residue after the separation of the aloin was entirely destitute of purgative properties; two statements which seem to be mutually contradictory.

In 1887, J. F. Brown,² confessed his bewilderment in regard to the properties of aloin and reviewed the work of preceding investigators.

He showed numerous contradictory statements, mostly therapeutical, and he also asks for information as to the true properties of a substance which was said to have the following solubilities, in water: 1 in 60, 1 in 90, 1 in 500, insoluble and freely soluble.

The preceding extracts are typical examples of the contradictory nature of the entire literature upon the subject and it is not surprising that the properties of the commercial product of the present time should differ from the properties attributed to it by the early investigators.

The following table shows a few of the solubilities ascribed by different authorities to the various aloins:

BARBALOIN.				
	<i>Sol. in Water.</i>	<i>Alcohol.</i>	<i>Ether.</i>	<i>Remarks.</i>
	15° C.	15° C.		
U. S. P.	1 — 60	1 — 20	1 — 470	
Pharmacographia	freely, warm sparingly, cold	freely, warm sparingly, cold	insoluble	
SOCALOIN.				
	15° C.	15° C.		
U. S. P.	1 — 60	1 — 30	1 — 380	
Pharmacographia	1 — 90	1 — 30	1 — 380	
VARIETY NOT MENTIONED.				
Gmelin's Handbuch	sparingly			According to: Stenhouse
Gmelin's Handbuch	1 — 600	readily		Smith
Gmelin's Handbuch	1 — 10	1 — 2 (86% alc.)	1 — 8	Robiquet

¹ 1877. *Proc. Amer. Pharm. Assoc.*, 401.

² *Amer. Jour. Pharm.*, 59, 193.

	<i>Sol. in Water.</i>	<i>Alcohol.</i>	<i>Ether.</i>	<i>Remarks.</i>
Fehling's Handwörterbuch	1 — 6cc 1 — 60 cold	1 — 2 (86% alc)	1 — 8	
Storer's Dictionary	1 — 5 boiling	very soluble	insoluble	
Wohler's Organic Chem.	difficultly cold	difficultly cold		
Phillips Mat. Med. and Therap.	sparingly cold readily, warm 1 — 600 cold	insol. cold readily, warm		
Sohns' Dict. Act. Prin. Plants	1 — 10 boiling	soluble	diff. soluble	
Ladenburg's Handwörterbuch	difficultly cold easily hot			

In the experiments upon commercial samples the solubility was taken at 25° C. instead of 15° C., as the latter temperature is seldom attainable for working purposes in an ordinary laboratory.

The solubility in water was ascertained by placing 1 gramme of aloin in a stoppered and graduated cylinder and adding the solvent in small portions, agitating thoroughly after each addition until solution was completed. It was observed that at a low temperature (15° C.) the aloin was only sparingly soluble, but at 25° C. it was dissolved with a perceptible deepening in color of the solution. The solubility in ether was ascertained by placing 1 gramme of aloin in a cylinder as before, adding 30 c.c. of ether and agitating occasionally for two hours, 20 c.c. of the filtered ether were then evaporated to dryness in a tared watch glass, and the solubility calculated from the weight of the residue.

The solubility in alcohol was taken in the same manner as the solubility in water. The melting point was taken by placing a small quantity in a capillary tube and immersing the tube in melted paraffin along with a thermometer. The lowest temperature at which it became transparent in the thinnest part of the tube was observed as the melting point.

The ash was calculated after incinerating a weighed portion in a platinum crucible. Notes were also made of the general appearance and microscopical characteristics of the different samples under consideration, and following is the report of their examination:

	Soluble in Water.	Soluble in Alcohol.	Soluble in Ether.	Degree Centigrade. Melting Point.	Per Cent. Ash.	Color.	Microscopic Appearance.
1	1-100	1-40	1-800	90°	0.50	Dark brownish yellow.	Distinct crystals, and crystal masses.
2	1-70	1-30	1-2500	118°	0.34	Light yellow.	Crystalline powder.
3	1-80	1-35	1-2000	115°	0.04	Light yellow.	Same as No. 2.
4	1-95	1-20	1-1170	100°	0.60	Brownish yellow.	Same as No. 1.

The variations in the properties attributed by the different authorities can only be accounted for upon the ground that the samples of aloin experimented upon varied greatly in purity.

Upon referring to the samples examined by the writer it will be noticed that a distinct ratio exists between the solubility in water and the solubility in ether; thus number one is soluble in 800 parts of ether and only 100 parts of water, while number two is soluble in 2,500 parts of ether and 70 parts of water. The presence of a small amount of ether-soluble resin would partially account for this difference, and it is extremely probable that strictly pure aloin is soluble to a less extent than any of the figures given; indeed one sample of aloin which was made by the writer was soluble in 16,000 parts of ether, but as further experiments are being made in this direction, it is hoped that something more definite regarding the solubility of strictly pure aloin can be reported in the near future.

305 CHERRY STREET, PHILADELPHIA.

LABORATORY NOTES ON PEROXIDE OF HYDROGEN, OIL OF WINTERGREEN AND OIL OF TURPENTINE.

BY CHARLES H. LA WALL, PH.G.

(Read before the Pennsylvania Pharmaceutical Association, June, 1895.)

Peroxide of hydrogen is a recent addition to the U. S. P., and it is required that it shall contain about 3 per cent., by weight, of absolute peroxide of hydrogen, corresponding to about ten volumes of available oxygen.

Manufacturers of this preparation, while recognizing the fact that the solution, as commonly made, is not very stable, and easily loses strength during transportation and handling, are very careful that it shall not contain a large excess of the dioxide over the ten volumes required.

The following table shows the volume strength of twenty-five samples examined during the past few months:

Volume.	Volume.	Volume.	Volume.
1 . . . 9'98	8 . . . 9'98	15 . . 9'84	22 . . . 9'90
2 . . . 10'02	9 . . . 10'23	16 . . . 9'28	23 . . . 10'02
3 . . . 9'33	10 . . . 10'02	17 . . . 9'35	24 . . . 10'28
4 . . . 9'03	11 . . . 9'98	18 . . . 10'28	25 . . . 10'37
5 . . . 9'97	12 . . . 10'06	19 . . . 10'19	
6 . . . 10'07	13 . . . 10'16	20 . . . 10'07	Average of 25,
7 . . . 10'25	14 . . . 9'77	21 . . . 10'15	9'94

OIL OF WINTERGREEN.

Oil of wintergreen is described officially as a volatile oil distilled from the leaves of *Gaultheria procumbens*, and although oil of sweet birch and methyl salicylate are no doubt often substituted for it in the market, the difference is so slight as scarcely to be detected.

Following are the characteristics of a number of samples examined by the writer since January 1, 1895; they were all offered as oil of wintergreen, and there was great uniformity among the samples, except as regards color, which varied from deep red to colorless. The specific gravity of a number of the samples was slightly higher than is required by the Pharmacopœia, which specifies from 1.175 to 1.185.

Specific Gravity.	Degree, Centigrade. Boiling Point.	Color.	Specific Gravity.	Degree, Centigrade. Boiling Point.	Color.
1. . . 1.180	217°	Dark red.	9. . . 1.186	215°	Yellow.
2. . . 1.180	214°	Light red.	10. . . 1.184	215°	Yellow.
3. . . 1.186	214°	Colorless.	11. . . 1.186	216°	Red.
4. . . 1.182	215°	Red.	12. . . 1.187	216°	Light red.
5. . . 1.185	216°	Dark red.	13. . . 1.184	216°	Yellow.
6. . . 1.185	215°	Colorless.	14. . . 1.186	216°	Colorless.
7. . . 1.187	215°	Colorless.	15. . . 1.182	215°	Yellow.
8. . . 1.189	215°	Red.			
Average of 15 samples				Specific Gravity. 1.184	Boiling Point. 215°

OIL OF TURPENTINE.

Two different grades of oil of turpentine are official; the following samples represent the commercial variety. They show great uniformity in characteristics, and it is a matter of especial note that although the samples represent several hundred barrels of turpentine, there was only one specimen which was insoluble in three parts of alcohol:

Specific Gravity.	Degree, Centigrade. Boiling Point.	Solubility in three parts Alcohol.	Specific Gravity.	Degree, Centigrade. Boiling Point.	Solubility in three parts Alcohol.
1. . . 0.8598	153°	Soluble.	9. . . 0.8580	154°	Soluble.
2. . . 0.8578	150°	Soluble.	10. . . 0.8558	155°	Soluble.
3. . . 0.8589	150°	Insoluble.	11. . . 0.8601	155°	Soluble.
4. . . 0.8670	150°	Soluble.	12. . . 0.8587	155°	Soluble.
5. . . 0.8673	153°	Soluble.	13. . . 0.8565	154°	Soluble.
6. . . 0.8600	153°	Soluble.	14. . . 0.8592	154°	Soluble.
7. . . 0.8590	152°	Soluble.	15. . . 0.8540	155°	Soluble.
8. . . 0.8550	155°	Soluble.			
Average of 15 samples				Specific Gravity. 0.8591	Boiling Point. 153° C.

EDITORIAL.

THE NEED OF MORE CHEMISTRY BY THE MEMBERS OF THE MEDICAL PROFESSION.

It is true that there are some members of the medical profession who are skilled chemists, and such have an advantage over their brethren which cannot be estimated. The great majority of physicians, however, are handicapped by dense ignorance of even the elements of chemistry, either because they have forgotten, or because they never knew. Most of these know enough to let the subject alone, but a few do not, and rush into print with statements that must be startling to the average chemist.

We have been led to make these remarks by reading a paper on *Calomel* "read in the Section on Practice of Medicine, at the Forty-sixth Annual Meeting of the American Medical Association, at Baltimore, Md., May 7-10, 1895," and published in the journal of the Association, June 1 (Vol. 24, page 836).

The author, very early in his paper, makes the following sweeping statement:

"Calomel is subject to adulteration; to improper purification in manufacture; and to chemic changes both atmospheric and in chemic mixtures. Bichlorid of mercury is the most common impurity found in it, and this varies from the smallest trace to comparatively large amounts. * * *

"On the other hand, calomel may contain such large amounts of barium, calcium, lead and other impurities that its action is greatly lessened and rendered almost inert. With these thoughts before us, and a thorough knowledge of making appropriate chemic tests for their confirmation, we can often explain untoward actions which might otherwise be attributed to a pure preparation."

The inference to be drawn from the foregoing quotation is, that between adulteration and dilution the unfortunate patient to whom calomel is administered has a very slim chance of recovery.

As a matter of fact, calomel is very rarely adulterated, and still more rarely does it contain corrosive sublimate or any other impurity. Probably no official chemical has received more study and care at the hands of manufacturing chemists than has calomel. Its production is attempted only by a very few of the largest manufacturers, which fact alone is somewhat of a safeguard, since an impure lot would certainly be traced to its origin. Then it does not occur in isolated crystals, as suggested by the author of the aforesaid paper, but is usually amorphous, or nearly so; the Pharmacopœia requiring it to be "a white impalpable powder, becoming yellowish-white on being triturated with strong pressure, and showing only small isolated crystals under a magnifying power of one hundred diameters."

That such a paper with such chemistry in it should have been read where it was is not surprising; but not only was it printed with all its faulty nomenclature in the journal of the Association, but it was discussed in the meeting in a way to give it support, except that one member questioned the statement about contamination with corrosive sublimate, and announced that he had, with the aid of a prominent chemist, been unable to find any samples of calomel that contained corrosive sublimate. The reader is staggered, however, by the following statement from the same member: "We might have some oxid of calomel, but there was no single instance in which bichlorid of mercury was found."

"Oxid of calomel" is a new compound to us, and "bichlorid of mercury" is without parallel as an illustration of ancient nomenclature and modern reform spelling of chemical terms.

Where were the chemists in the meeting that such incongruous statements were allowed to go unchallenged?

COFFEE OR CHICORY.

Under the title of "Chicory in Belgium," Consul Henry C. Morris, in Consular Report No. 169, page 157, gives some statistics concerning the exportation of chicory from that country, which should engage the attention of every one in this country who is interested in maintaining our food supply at a reasonable standard. The consul evidently looks on the increased demand for chicory in this country as commendable, while we are inclined to take the opposite view.

Chicory has rather a bad name among pharmacists because it occasionally masquerades as taraxacum. It has long been used as a cheap adulterant and substitute for coffee in England and on the continent of Europe, and the result is that one rarely gets in those places the delicious cup of coffee that he is accustomed to in the United States.

In England the substitution and admixture has been carried to such an extent that coffee has, to a large extent, given way to tea, which has become the popular beverage.

In the United States, on the contrary, coffee is the more popular of the two, because here it is the custom of many consumers to buy the coffee in an unground condition and either have it ground at once in their presence, or grind it at home as needed. Of course this does not apply to boarding houses and hotels, where cheaper grades are often employed, which means an admixture of chicory or some other cheap material.

It is safe to say that no consumer of coffee ever goes to his grocer and demands chicory, or a mixture of that substance and coffee. Chicory yields a black, astringent infusion, which is devoid the stimulating and aromatic properties that are a necessary part of coffee.

All the statements about chicory being a healthy drink, recommended by the medical profession and beneficial to those suffering from disorders of the stomach, are fairy tales invented by those commercially interested in the substitution of it for coffee.

The yearly chicory crop of Belgium amounts to about 350,000 tons, of which 4,000 tons are sent to the United States. The growth of the demand for this adulterant in this country may be seen by the value of the imports of it from Belgium for five years as follows:

1889	11,166 dollars.
1890	39,440 "
1891	80,074 "
1892	78,295 "
1893	129,662 "

The report of Consul Morris has already called forth some criticism in one of our leading magazines, but the newspapers, as a rule, have echoed a favorable

sentiment under the false impression that chicory would benefit the poor. Owing to the adverse criticism of his report, the same consul has seen fit to send another communication on the same subject, entitled "Chicory as a Beverage." (Consular Report No. 176, page 139, May, 1895). In this report he defends his former remarks, and advocates its use as a beverage because of its harmlessness, and because it is used in England, France and Belgium, under legal restrictions.

We cannot see, however, that the weight of his argument is strengthened in the least. We cannot get legal restrictions in this country; popular sentiment is stronger to keep an objectionable article out, and on that we must depend.

Chicory belongs in company with prepared and roasted beet roots, rye bread, acorns and all the other coffee substitutes that are utterly devoid of the properties for which coffee is employed.

It would be an excellent substance for Congress to place a high duty upon, for it is not demanded by the consumer, and can only be sold under some other name, or in a mixture.

THE AMERICAN MEDICAL ASSOCIATION AND PATENT MEDICINES.

There is no doubt that the members of the medical profession, as a class, are opposed to patent medicines. The encouragement which these remedies occasionally receive from physicians is usually due to carelessness or inexcusable ignorance.

The American Medical Association, at its May meeting in Baltimore, placed itself clearly on record in regard to this subject, and in a manner that is highly commendable. It involves a much needed reform in the Association's journal, as shown by the following extract from the report of the Board of Trustees concerning that journal:

"During the year no advertisements of secret remedies have been accepted that were not accompanied by a formula, but to still further comply with what appears to be the desire of a large number of those interested in the highest success of the Journal, the editor, with the termination of present contracts, has been instructed to accept no advertisements of medicinal preparations, the proprietors of which do not give a formula containing the official or chemic name and quantity of each composing ingredient, to be inserted as a part of the advertisement."

This report was adopted with considerable enthusiasm, and we think the Board need not have used the guarded language it did by saying they proposed to "comply with what *appears* to be the desire of a *large* number," for the sentiment of those present not only *appeared* to be, but actually *was unanimous*.

As many of the advertisements in the above-mentioned journal, as well as in many other medical journals, have long been a standing disgrace to the profession they represent, we, more than a month after the meeting, made an examination of the advertising pages of the Association's journal, but were unable to notice that any decided change had taken place. We, therefore, concluded that the advertisers' contracts had not expired.

There were, however, a number of advertisements in which the formulas were given, and the conclusion was that their contracts had expired, or else they were preparing to renew.

Two of these formulas were so unique, and at the same time so interesting, that we venture to enlighten our readers by reproducing them here, as follows:

ANTI-KAMNIA.

"FORMULA."

"A combination of coal tar derivatives of the series $C_n H_{2n-6}$, into which the amines have entered, forming the various amido-compounds. Antikamnia has as its base the derivatives of the amido-benzoles, so combined as to obviate the bad effects caused by many of this series of organic bodies when administered alone."

CAMPHO-LYPTUS.

"COMPOSITION."

"Eucalyptol, Campho-Thymic Acid, Hydrous Chloral."

No possible good can result from publishing such formulas as these. They are simply ridiculous, and the *Journal of the American Medical Association*, by admitting them, lays itself open to the possibility of being considered the most "gullible" medical journal on the face of the earth.

There is no secret about the faculty necessary to decide what should be admitted. We could name a dozen members of the medical profession who possess that inborn knowledge that would enable them to decide almost in a moment on the admissibility of an advertisement. The result, however, would be such a "clean sweep" in the advertising pages of the Association's *Journal* as to be apparent to the most casual reader.

There is another lesson to be derived from these so-called formulas. We have heard a great deal in the past few years about legislation to control the manufacture and sale of patent medicines, and nearly all of the suggestions are based on the publication of the formula on the label. But the experience of the American Medical Association shows us that it will be necessary to define what shall constitute a formula.

ALCOHOL LEGISLATION.

There are many ways of viewing almost every subject, and alcohol legislation is not an exception. The Philadelphia College of Pharmacy has endorsed recommendations to the Secretary of the Treasury asking for the enforcement of the present law, as it is believed it would be to the advantage of the pharmacist. The *Chicago Retail Druggists' Association*, however, takes a different view of the subject, and has sent the following resolutions to many State Associations asking for their adoption:

Resolved, That this association favors the repeal of the clause in the present tariff law exempting alcohol used in manufactures from internal revenue taxation, on the ground primarily that the law in its present form would inevitably be attended with gross discrimination against the retail druggist, and great resulting loss to his business and profession, and with no material advantage to the people to compensate for the serious loss to the national revenue from the remission of the said tax.

Resolved, That a special Committee on National Legislation, to consist of three members, be appointed with authority to act independently, or in co-operation with such similar committees as may be appointed by other pharmaceutical associations, in behalf of measures promotive of the interests of legitimate pharmacy and the retail drug trade as said interests may be affected by national legislation, including specifically the said law relating to alcohol taxation, the laws concerning trade-marks, copyrights and patents as related to medicinal preparations, and the law imposing an annual tax on druggists as retail liquor dealers.

It is the hope of the undersigned committee that your association will act without delay in this important matter, and thus enable the sentiment of the retail drug trade of the country properly to make itself known, and to assert its due influence in behalf of right legislation and against such laws as may be inimical to the profession and trade.

This committee hopes to be favored with notice of the appointment of the committee suggested, with names and addresses of the members. All communications relating to this letter should be addressed to A. E. Ebert, Secretary, State and Polk Streets, Chicago.

We have the honor to be, with fraternal regards,

WILLIAM BODEMANN,

ALBERT E. EBERT,

GEORGE P. ENGELHARD,

Committee Chicago Retail Druggists' Association.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

KATECHISMUS DER STÖCHIOMETRIE, mit besonderer Rücksichtnahme auf die Bedürfnisse der Studierenden der Pharmazie, Medizin und Technik. Sechste Auflage. Albert und Hermann Frickhinger. München, 1895. 284 Seiten.

Catechism of Stoichiometry, with special reference to the needs of students of pharmacy, medicine and technics. Sixth edition. Albert and Hermann Frickhinger, Munich. 1895. 284 pp.

The first edition of this little manual appeared in 1844, under the authorship of the elder Frickhinger, an apothecary of Nördlingen, who continued it through five editions, the last appearing in 1873. Now, with the aid of his son, it is again brought out in a new edition, the sixth. The book has been very popular in Germany, and, indeed, seems to us to be a very handy and useful book for the classes of students referred to in the title. It is written in the form of a series of questions and problems, to which full answers and solutions are given, with all needed explanations. It includes first simple arithmetical problems, then questions on the subjects of volume and notation of elements and the rules for the formation and naming of molecules, the names, formulæ and molecular weights of all compounds likely to interest the pharmacist or medical student, practical problems in volumetric and gravimetric analysis, and lastly, on the main outlines of chemical theory. A very full index completes the work, and makes it thoroughly available for ready reference.

ON THE SPEED OF THE LIBERATION OF IODINE IN MIXED SOLUTIONS OF POTASSIUM CHLORATE, POTASSIUM IODIDE AND HYDROCHLORIC ACID. By Herman Schlundt. Bulletin of the University of Wisconsin, Science Series, Vol. I, No. I. Madison, Wis. 1894.

We should have more contributions like this from our pharmaceutical schools. The author takes up a subject in chemical dynamics and systematically pushes it to a successful conclusion. The results can best be understood by quoting the conclusions as follows:

(1) The speed of the reaction is influenced to a marked degree by the temperature, the speed increasing with the rise of temperature.

(2) The presence in the mixture of an excess of one or more of the components increases the speed. The effect of an excess of potassium iodide is about the same as an equivalent excess of potassium chlorate. But a corresponding excess of acid causes a greater increase of speed.

(3) Other things being equal, the speed of the reaction is modified by degree of concentration of the mixtures, the speed increasing with the concentration.

(4) To obtain the complete reduction of potassium chlorate by potassium iodide and hydrochloric acid in a comparatively short time, the solutions must be concentrated, there must be quite an excess of both potassium iodide and hydrochloric acid, and the mixture must be strongly heated.

(5) The presence of an excess of the ordinary inorganic acids accelerates the reaction. Assuming their respective influences as indicating their relative strengths, the results on acceleration show the following order of strength: (1) hydrobromic; (2) hydrochloric; (3) nitric; (4) sulphuric.

(6) Organic acids and boric acid do not increase the speed.

UEBER SECRETE UND SECRETBILDUNG. Von Prof. Dr. A. Tschirsch. Reprint from *Zeitschrift des Allgemeinen österr. Apotheker-Vereines*. No. 30. 1894.

WEITERE MITTHEILUNG ÜBER DAS KUPFER VOM STANDPUNKTE DER TOXIKOLOGIE. Von Prof. Dr. A. Tschirsch. Reprint from *Zeitschrift des Allgem. österr. Apotheker-Vereines*. No. 35. 1894

UNTERSUCHUNGEN ÜBER DIE SECRETE. Mitgetheilt von A. Tschirsch. 10 UEBER DEN TOLUBALSAM. Von Paul Oberlander. Reprint from *Archiv der Pharmacie*, **232**, 7 und 8 Heft., 559. 11 UEBER DEN SUCCINIT. Von E. Aweng. Reprint from *Archiv der Pharmacie*, **232**, 9 Heft.

SEMI-ANNUAL REPORT OF SCHIMMEL & Co. April, 1895.

VIERTELJAHRESSCHRIFT ÜBER DIE FORTSCHRITTE AUF DEM GEBIETE DER CHEMIE DER NAHRUNGS-UND GENUSSMITTEL. Neunter Jahrgang, Viertes Heft.

FREE HYDROCHLORIC ACID—IS ITS ABSENCE FROM THE STOMACH A SIGN OF CANCER? By Richard B. Faulkner, M.D. Reprinted from the *Journal of the American Medical Association*, March 2, 1895.

A TREATISE ON THE WINE OF COD-LIVER OIL WITH PEPTONATE OF IRON. Detroit. Frederick Stearns & Co.

The following new periodicals relating to pharmacy have recently appeared:

Annales de Pharmacie is a monthly journal devoted to practical pharmacy, pharmacognosy, foods, chemistry, toxicology, microscopy, hygiene, professional interests and legislation. The editor is Fernand Ranwez, pharmacist at Louvain, Belgium, and the publisher is Louis Honart, likewise a pharmacist, at the same place. The first number starts out well with original articles on the "Adulteration of Saffron," "Syrups of the Belgian Pharmacopoeia" and "Pharmacy in Belgium at the present time." There are also reviews from other journals—varieties, notes and bibliography. The two succeeding numbers which have reached us are fully equal to the first.

Medicine.—A monthly journal of medicine and surgery, edited by Harold N. Moyer, M.D., and published by George S. Davis, Detroit, Mich. The first number consists of sixty-four pages, and is made up of a number of original papers by well-known medical writers, and of a comprehensive review of the progress of medical science and literature.

The Buffalo Druggist is a claimant for honors in the field of pharmaceutical literature; it is devoted to the advancement of pharmacy and the interests of the general drug, paint and oil trade.

The Graduate, which has been issued annually by the Alumni Association of the Chicago College of Pharmacy, will in future appear quarterly.

PROCEEDINGS OF THE MISSOURI STATE PHARMACEUTICAL ASSOCIATION, held at Excelsior Springs, Mo., June 12 to 15, 1894. A number of original papers appear in the volume, some of which have already been printed in this Journal.

MINUTES OF THE PHARMACEUTICAL MEETING.

The meeting was held Tuesday, May 21st, at 3 P.M. Prof. F. X. Moerk, Ph.G., was elected Chairman.

On motion the reading of the minutes of the last meeting was dispensed with.

A specimen of *Chêne gomme*, an educt of the *Spermolepes tannifera*, was presented to the cabinet by Prof. E. Haeckel, an honorary member of our College, residing at Marseilles, France. It is said to contain about 25 per cent. to 30 per cent. of tannin. The gum is obtained in Algiers, and is said to be very abundant there.

Mr. Henry N. Rittenhouse, Ph.G., presented a specimen of California licorice root, gathered in San Joaquin Valley, where it has been growing wild for twenty years under rather unfavorable circumstances.

A paper upon the Tannin of Cloves, by W. L. Peabody, Ph.G., was presented. His attention was called to the subject by the statement that cloves contained 18 per cent. of tannin. The samples examined showed the presence of 10.03 to 13.35 per cent. of tannin. A cheap specimen of cloves showed 5 per cent. of tannin; examination showed the tannin to be identical with nutgall-tannin. It was thought that the percentage of tannin might be used as a means of forming a proximate judgment regarding the purity of cloves, as a tannin-bearing substance would not likely be used as a sophistication.

Anatolian Licorice Root was the subject of a paper by James W. Nickum, Ph.G., of Salt Lake City, Utah. From this paper we learn that the root contains 23.84 per cent. of extract by the use of acetone, but it yields less with ethylic alcohol. Turkish root yielded 14.06; Spanish root, 7.02; Persian root, 7.02 with acetone. Anatolia is a corruption of the word Andoli, and the district meant by this term is almost identical with Asia Minor.

The remaining paper of pharmaceutical character was one by Miss Florence Yapple, of Chillicothe, Ohio, upon Twelve Varieties of Commercial Cocoas. The examination showed that there had been little or no adulteration practiced in any of the specimens tested. The papers in full are contained in the June number of the JOURNAL.

There being no further business, a motion to adjourn was made and carried.

T. S. WIEGAND.

PHARMACEUTICAL ASSOCIATIONS.

THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The Pennsylvania Pharmaceutical Association held its eighteenth annual meeting at Eagle's Mere, Penna., June 18 to 21, 1895.

The pleasant surroundings, the fine weather and the admirable combination of business and pleasure made this one of the most notable meetings in the history of the Association; although the attendance was not so large as that on a number of previous occasions, yet the sessions were attended by a large number of those present, and almost every one took an active part in the proceedings.

The President, W. H. Reed, in his address reviewed the condition of the profession during the past year and made a number of suggestions whereby the Association might be improved; these suggestions were on reference to a committee, nearly all adopted at a subsequent session. Delegates were in attendance from the Associations of New York State, New Jersey and Maryland.

The Secretary reported on the general condition of the Association and gave a detailed account of the publication of the proceedings. The Treasurer was able to show a very satisfactory condition of the Association's finances.

The following officers were elected:

President, H. N. Cox; First Vice-President, John H. Hahn, Second Vice-President, D. M. Krauser; Treasurer, J. L. Lemberger; Secretary, J. A. Miller; Executive Committee, A. R. Durham, W. S. Seabold, J. H. Knouse.

Resolutions were adopted favoring the betterment of the pharmacist in the army and navy, and asking that his rank be made that of assistant surgeon.

The subject of tax-free alcohol was brought up and a subsequent session was set apart for its consideration.

At this session the resolutions of the Chicago Retail Druggists' Association on this subject were read, as well as the combined circulars of the National Wholesale Druggists' Association, the Philadelphia Drug Exchange and the Philadelphia College of Pharmacy.

After some discussion the Association placed itself on record as favoring tax-free alcohol as recommended by the circular of the three last-named associations.

J. W. Miller explained the intentions of the Universal Trade Association of Retail Druggists, and asked for an endorsement of their plan of dealing with various evils which injure the pharmacist. This Association, with headquarters at Detroit, Michigan, proposes, with a million dollars capital, to furnish stamps to manufacturers by which the packages may be traced to the one who offers it at a cut rate. This plan was at first endorsed, but at a subsequent session it was reconsidered and after much discussion it was decided to recommend the formation of a national retail druggists' association, without specifying the particular one at Detroit.

C. T. George presented the report of the Committee on Legislation which was adopted.

W. L. Cliffe read the report of the Committee on Adulteration, and gave the results of analysis of prescriptions compounded by one druggist of Philadelphia. The sum of \$200 was directed to be placed at the call of the Committee.

George J. Seabury was elected an honorary member. A number of delegates and committees reported, and then one whole session was given to the reading of papers.

C. H. La Wall read a paper on *Commercial Aloins* (see page 367), and one on *Laboratory Notes on Peroxide of Hydrogen, Oil of Wintergreen and Oil of Turpentine* (see page 372).

Papers on *The Sabbath as a Day of Rest*, were offered by C. B. Lowe, D. M. Krauser and Emile Ott.

C. B. Lowe presented a paper on *The Pharmacy Law of Pennsylvania and its Administration*, in which he delicately drew attention to some of the defects in the law, as well as weakness in the past administration. C. T. George in discussing the paper admitted some of the short-comings of the Board of Pharmacy, and satisfactorily explained them. It was evidently the prevailing opinion that the members of the Board should receive more money, and that their compensation should come directly from the State Treasury, and not be paid by the pharmacists of the State as at present.

A paper by Louis Emanuel was read. It was in answer to query No. 23: *How may the Pharmacy Law be Efficiently Enforced?*

He illustrated some of the difficulties of enforcing the law, and showed that when properly enforced it would protect the public as well as the members of the pharmaceutical profession.

John F. Patton read an interesting paper on *Tendencies*. After numerous illustrations of the tendency of the human race in general, the author considered the tendency of the pharmacist in particular, as follows:

The present status of pharmacy is that of evolution, with a strong tendency to eliminate the pharmacist. The large pharmaceutical manufacturers, with their wealth, enterprise and acknowledged ability, have not only relieved the pharmacist from the labor of making his own preparations, but they have instructed the physician as to the value of the remedies, and aided him in his practice by applying the same. Ethically, this is all wrong; but it is business. It has tended, however, to the degradation of the profession, and reduced the practice of medicine to a mere matter of consulting manufacturers' catalogues and price-lists, to say nothing of the great damage it has done to legitimate pharmacy. Thus, the queer anomaly is presented of reversing the order of therapeutics, by fitting the disease to the remedy, instead of the medicine to the disease.

The enterprise of the manufacturer does not stop here. We observe a tendency to eliminate the physician also. For, do we not find treatment and dosage, with other information conducive to self-medication, plainly printed on their packages? Having, by the aid of the physician, introduced their products to the consumer, they would now instruct the latter to do without the services of the former—a case of base ingratitude.

A paper was read on *A Glance at the Contributions of Dr. Priestly to Pharmaceutical Science*, by the late Mrs. Susan C. McCay, a lineal descendant of Dr. Priestly. This paper is of considerable historical interest.

A Record of 1,000 Poison Sales was the title of a paper by Emile Ott. This gave a list of poisons called for in a Philadelphia store. Laudanum headed the list, having been called for 284 times. It was closely followed by "Rough on Rats," 275 times, and Paris green 245 times. There was then a decided drop to corrosive sublimate, 80 times. A total of 41 articles were given, representing 1,038 sales. A large number were called for but once.

The remaining papers were: *A Country Drug Store*, by S. H. Hill; *Cataloguing a Drug Store*, by C. B. Lowe; *Percolating Opium*, *A Tabulated*

List of Poisons and Aromatic Elixir, by Emile Ott; *Sponges*, by William B. Burk.

Some additional reports, and the installation of officers concluded the proceedings.

Gettysburg Springs was selected as the place for holding the next meeting, on June 9, 1896.

THE MINNESOTA PHARMACEUTICAL ASSOCIATION.

The eleventh annual meeting of this Association was held at Lake Minnetonka, Minn., June 11 to 13, 1895.

The following officers were elected: President, William Gausewitz; Vice-Presidents, L. Trautman, M. A. Sheldrup and Miss Emma Combacker; Secretary and Treasurer, C. T. Heller; Executive Committee, S. H. Reeves, A. T. Hall and J. L. Stiles.

The leading paper was by Dr. J. W. Harrah, on *Trade Interests*. The committee, of which he was chairman, advised the formation of a corporation consisting of members of the State Association to manufacture household remedies, to advertise them, and to promote their sale in preference to patent medicines. The Association, as a body, heartily endorsed this recommendation.

G. H. Webster presented a paper on the *Benefit of Pharmacy Laws*.

Prof. J. P. Remington delivered a lecture on *Prescription Difficulties*, to a large and appreciative audience.

The Best Means for a Retail Druggist to Advertise, was the subject of a practical paper by Truman Griffin, and *The Pharmacopœia* was the title of one by C. R. Marelius.

The second Tuesday of June, 1896, was decided on as the time for holding the next meeting, and Lake Minnetonka was selected as the place.

FLORIDA PHARMACEUTICAL ASSOCIATION.

The ninth annual session of the Florida State Pharmaceutical Association convened in the city of Jacksonville, Fla., May 8th, at the New Duval Hotel.

The meeting was presided over by President F. P. McElroy, of Dade City, with R. J. Martinez, of Jacksonville, Secretary.

President McElroy introduced Mayor Fleeter. The latter extended a hearty welcome to the members, and spoke of the good work that was to be accomplished by the Association.

President McElroy responded in a few words, thanking the Mayor for the kind words expressed, and then read his annual address. He then spoke of the importance of the Association, both to the members and people of the State. He advocated a change being made in the present State pharmaceutical laws, so that general stores could not carry a line of drugs and medicines unless compounded by a duly registered pharmacist, as is necessary in places of more than 200 inhabitants, under the present State law. The President also suggested that a change in section 2 of the law, so that physicians could not compound their own medicines, and thus take legitimate trade away from the drug stores and pharmacies.

The Committee on Legislation reported that a draft of the amendments desired had been prepared and placed in proper hands, with the assurance that the matter would have attention.

The reports of Secretary Martinez and Treasurer Clark were read, and, upon motion, approved.

The afternoon session was largely taken up on matters relating to the work of pharmacists. An interesting letter on "Saw Palmetto," written by Dr. J. M. Dixon, of Titusville, was read.

Officers were elected for the ensuing year, as follows: President, W. I. Woodman, St. Augustine; First Vice-President, J. A. Conover, Jacksonville; Second Vice-President, Dr. Mendoza, Tampa; Third Vice-President, J. H. Pittmann, Tampa; Secretary, M. W. Stewart, Palatka; Treasurer, Francis Lawton, Jacksonville; Local Secretary, H. R. Thomas, Jacksonville.

Committees were appointed by the President, and it was decided to hold the next meeting at Jacksonville, the time to be decided by the Executive Committee.

The Association then adjourned *sine die*.

M. W. STEWART, *Secretary*.

PALATKA, Fla.

OBITUARY.

JOHN S. NEWTON, PH.G.

Dr. John S. Newton, Ph.G., Class of 1866, was born in Philadelphia, Pa., May 29, 1842, and died at his late residence, 4031 Brown Street, West Philadelphia, August 18, 1894, of Bright's disease, aged 52 years, 2 months and 20 days.

He was the oldest son of Ralph and Emily Newton, and received his education in the Locust Street Grammar School and Central High School, and was afterwards made assistant professor of the latter.

He learned the drug business with his father and his brother, Alfred W. Newton, Ph.G., Class of 1864, was his preceptor, while he attended the Philadelphia College of Pharmacy, and graduated in the Class of 1866. He also attended the Jefferson Medical College, and graduated as a physician in 1867. He was married, in 1871, to Miss Frances Taylor, of Troy, N. Y., who died in September, 1883, leaving two daughters, who survive them. In 1879, he was engaged in the drug business in Columbus, Ga., where he contracted the fatal disease; afterwards he removed to Philadelphia, and located in West Philadelphia, where he practiced medicine up to the time of his decease. He was a member of Pennsylvania Lodge, No. 144, Ancient Order of United Workmen, and American Castle, No. 35, Knights of the Golden Eagle. His funeral services were held at Calvary P. E. Church, Forty-first and Brown Streets, on the following Tuesday, August 21, 1895, the interment being private. He was a member of the Alumni Association of the Philadelphia College of Pharmacy, which he joined March 16, 1866.

W. E. K.

EDWARD C. JONES, PH.G.

Edward C. Jones, Ph.G., was born on Fifth Street above Market, Philadelphia, Pa., August 26, 1843, and died suddenly, at Media, Pa., May 29, 1895, aged 51 years 9 months and 3 days.

He was the son of Wm. and Jane P. Jones. His parents were members of the Society of Friends (Orthodox). Edward in early childhood was in delicate

health and was sent to Friends' Select School, Philadelphia, where he received his early training, and afterwards was sent to Westtown Boarding School, Chester County, Pa., where he finished his education. September 6, 1860, when 17 years of age, he went to learn the drug business with Amos H. Yarnall, at the southeast corner Fifteenth and Market Streets, and remained with him four years; during his apprenticeship he attended the Philadelphia College of Pharmacy and graduated with the Class of 1864, being second in class, his thesis being entitled "*Leptandra Virginica*."

During this year the Alumni Association of the Philadelphia College of Pharmacy was organized, and Edward was one of its projectors, and through his untiring efforts in the early days of its existence is due the high place she holds to-day among the graduates of the College. In 1868, he was elected Treasurer of the Association, and has held that honorable position up to the time of his decease, a period of twenty-seven years.

On the 13th of March, 1866, he was elected a member of the College, and has always taken an active interest in its affairs. On the 30th of March, 1874, he was elected by his fellow-members of the College as a member of the Board of Trustees, and he continuously served the Institution as Trustee up to the day of his death, over twenty-one years. In 1864, he became a member of the American Pharmaceutical Association, and was present at the meeting held at Cincinnati, O., and has attended almost every annual session since.

He became a member of the Pennsylvania State Pharmaceutical Association at its organization, and has attended almost all of its sessions and was a faithful and zealous advocate of any improvement or advancement in the Pharmaceutical profession.

After his graduation from the College he went to Chicago, Ill., and spent a short time in the laboratory of E. H. Sargent, and afterwards in the drug store of W. J. M. Gordon, Cincinnati, O.; but his health failed him, and he returned to his native city and entered into business with his former preceptor, at the old-established store, southeast corner Fifteenth and Market Streets. In 1877, his partner, Mr. Yarnall, died, when Mr. Jones succeeded him at the head of the firm of Jones & Shaw, and shortly afterwards Mr. Shaw retired from the firm; when Wm. B. Thompson was associated with him under the firm name of E. C. Jones & Co., and still later Mr. Thompson also retired, when Wm. H. Earl entered the firm, which continued until 1889, when they became involved and Mr. Jones retired from the business, since which time he has been with the firm of Robt. Shoemaker & Co., Fourth and Race Streets, Philadelphia, Pa., as salesman.

Edward C. Jones was highly esteemed by all who knew him, and had a host of friends among the graduates of the College. He had always taken an active interest in all the affairs of the pharmaceutical profession.

He was a consistent member of the Orthodox branch of the Society of Friends, and took a deep interest in all of the affairs of the Society.

His sudden death was a great surprise and shock to his many friends. The day previous he was at his usual avocation, visiting many of the drug stores in the western portion of the city. He returned to his home in Media apparently as well as usual and quite cheerful. He retired to his room about 11 o'clock, after having spent the evening in writing; early the next morning his sister called to him, and, receiving no response, she entered his room, and

found that he had passed quietly away a few hours before without a struggle.

We shall miss his genial face and kindly disposition, but we feel assured that our loss has been his eternal gain. He was never married, and leaves an only sister and two brothers to mourn his loss.

W. E. K.

NEWS AND NOTES.

Henry Kraemer, well known as the Reporter on Progress of Pharmacy in the American Pharmaceutical Association, has accepted the chair of *Materia Medica* and Pharmacognosy in the Illinois College of Pharmacy. He will devote a year to study in Europe, before assuming his duties in Chicago. Professor Kraemer recently received the degree of Ph.B., after a four years' course at Columbia College, New York.

J. B. Nagelvoort has been appointed Professor of Applied Pharmaceutical Chemistry at the Illinois College of Pharmacy. He has for a number of years been in the analytical department of Parke, Davis & Co., at Detroit.

N. Gray Bartlett, after many years' service as Professor of Pharmaceutical and Organic Chemistry in the Chicago College of Pharmacy, has resigned. The position has been filled by the appointment of Prof. W. A. Puckner.

FORMULAS.

MIXTURE FOR THE RELIEF OF STINGS OF INSECTS.

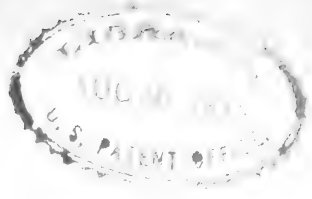
Solution of ammonia	7	parts.
Collodion	3	"
Salicylic acid	0.3	"

PENCILS OF SALICYLIC ACID.

Salicylic acid	20	grammes.
White wax	25	"
Lanolin	55	"

PENCILS OF SALICYLIC ACID AND CHRYSAROBIN.

Chrysarobin	10	grammes.
Salicylic acid	20	"
White wax	20	"
Lanolin	50	"



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AUGUST, 1895.

VIBURNUM PRUNIFOLIUM AND VIBURNUM OPULUS.

BY L. E. SAYRE,

Member of Research Committee C, Revision Committee of U. S. P.

The two barks, *Viburnum prunifolium* and *Viburnum opulus*, have been for some time almost equally popular among practitioners. Wherein lies the advantage of one over the other, therapeutically, is, perhaps, difficult for one to say without more data than is at present at our command; but, as far as my investigations have gone, it appears that the *prunifolium* is more frequently depended upon in neuralgia of the ovaries, that the *opulus* is most useful in uterine and ovarian pain, in dysmenorrhœa and pains of that class, and that it is more often depended upon for prevention of abortion whether accidental or habitual. But it is not so much a question of therapeutical merits of the one or the other of these barks which so much engages the attention of the pharmacist, as it is the physical characteristics which will enable one to assure himself of their purity.

The Pharmacopœia describes these two barks as follows:

VIBURNUM OPULUS.

"In flattish or curved bands, or occasionally in quills, sometimes 30 centimetres long, and from 1 to 1.5 millimetres thick; outer surface ash-gray, marked with scattered, somewhat transversely elongated warts of a brownish color, due to abrasion, and more or less marked with blackish dots, and chiefly in a longitudinal direction, with black, irregular lines or thin ridges; underneath the easily-removed corky layer of a pale brownish or somewhat reddish-brown color; the inner surface dingy white or brownish; fracture tough, the tissue separating in layers; inodorous; taste somewhat astringent and bitter."

VIBURNUM PRUNIFOLIUM.

"In thin pieces or quills, glossy purplish-brown, with scattered warts and minute black dots; when collected from old wood, grayish-brown; the thin,

corky layer easily removed from the green layer; inner surface whitish, smooth; fracture short; inodorous; somewhat astringent and bitter."

Among the problems presented to Research Committee C by its chairman, Dr. H. H. Rusby, is one which relates to the question of discrimination of these two barks, particularly in the crushed or powdered condition, and one relating to the distinction between the bark of the root and bark of the stem of *Viburnum prunifolium*. Entering upon the investigation, I have formulated the problem as follows:

(1) What are the distinguishing characteristics which will identify the bark of the stem and the bark of the root of *Viburnum prunifolium*?

(2) How can one distinguish between the bark of *Viburnum prunifolium* and *V. opulus*?

(3) What are the differential characteristics of these barks which will enable one to distinguish between them in the crushed condition or in the state of powder?

Before seriously taking up the third question, it is necessary to have clearly before one the gross characteristics of these barks, and to understand the relation between them structurally as well. At the same time, it is essential that such a knowledge of the constituents be had as shall enable one to compare them pharmaceutically.

It is the object of this paper to lay before those who desire to contribute to the work a statement of what has been done thus far in answering the first and second questions. I am gratified to state that there are those, even outside of the committee, who have interested themselves in the work, and who desire such a statement. It is this that has suggested this paper.

For authentic specimens for the investigation I am indebted to Dr. H. H. Rusby. These were as follows:

NAME OF SPECIMEN AND PHYSICAL CHARACTERISTICS.

I. *Viburnum opulus*.—Trunk bark, commercial specimen from Parke, Davis & Co. Curved pieces from 6 to 10 inches (150 to 250 mm.) in length, and about $\frac{1}{12}$ inch (2 mm.) in thickness, the inner surface usually with strips of the white wood adhering. The bark consists of three layers, the periderm, a green chlorophyll layer, and a yellowish or brownish-yellow inner bark. The periderm is nearly smooth, especially on the younger bark, greenish or greenish-gray, marked with greenish and whitish patches, and

with brown, corky warts. Fracture short through the outer layer; the inner layer tears in long, fibrous strips

II. *Viburnum prunifolium*.—Trunk-bark collected by Dr. H. H. Rusby, at Franklin, N. J., May, 1894. Curved pieces and fragments about $\frac{1}{8}$ inch (4 mm.) thick; outer surface very rough, greenish or grayish, covered here and there with gray lichens; inner surface yellowish-white, about half as thick as the corky layer, free from adhering wood; the cork is thick, reddish, and shows, on a cross-section, small white spots dotted throughout its tissue. Fracture short.

III. *Viburnum prunifolium*.—Bark collected from small branches. Small curved pieces, very thin; periderm brownish-gray, smooth, overlaying a green chlorophyll layer; inner layer whitish, its inner surface yellowish-brown from exposure to air. Fracture short. It seems to possess the bitter principle to a greater extent than any of the preceding.

IV. *Viburnum prunifolium*.—Bark of root collected at Franklin, N. J., May, 1894, by Dr. H. H. Rusby. Quills or fragments, sometimes with strips of the yellowish-white wood adhering to the inner surface, which is brownish by exposure to air. The corky layer is grayish-brown, somewhat ridged so as to form more or less distinct meshes. The inner layer is thick, breaking with a short, or sometimes waxy, white fracture, easily cut or scraped with the fingernail.

V. *Bark of root (source unknown)*.—Flattish or curved pieces, from $\frac{1}{8}$ to $\frac{1}{6}$ inch (3 to 4 mm.) in thickness, covered by (or sometimes deprived of) a reddish or grayish-red cork. Inner layer of about equal thickness to the outer, breaking with a short, brownish-white or white fracture.

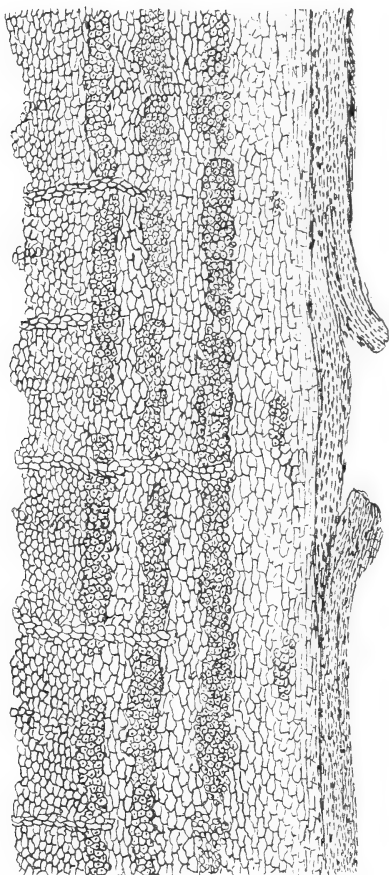
All of these specimens have a pronounced, peculiar odor, difficult to describe, differing quite considerably among themselves in this respect. The root-bark of *Viburnum prunifolium* has a somewhat disagreeable odor. All contain a bitter principle, this bitterness being particularly prominent in the root-bark and bark of small branches of *V. prunifolium*. In the trunk-bark the bitterness is noticeably less. In *Viburnum opulus* there is not much bitterness, but there is quite an astringent taste.

STRUCTURAL CHARACTERISTICS.

A cross-section of the stem bark of Viburnum opulus under the microscope shows the following structure: Immediately interior to

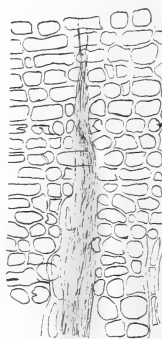
the periderm are numerous irregular clusters of stone cells. These are succeeded in the inner or bast layer by large clusters of bast fibres associated with a few stone cells. These clusters are arranged in bands parallel to the surface of the bark, and are separated from each other radially by narrow, one or two-rowed, straight medullary

FIG. 1.



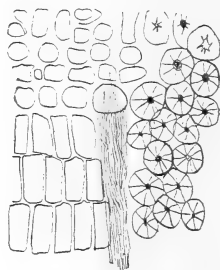
Viburnum opulus—Bark of stem.
Cross-section.

FIG. 2.



Viburnum opulus.
Bark of trunk.
Longitudinal section.

FIG. 3.



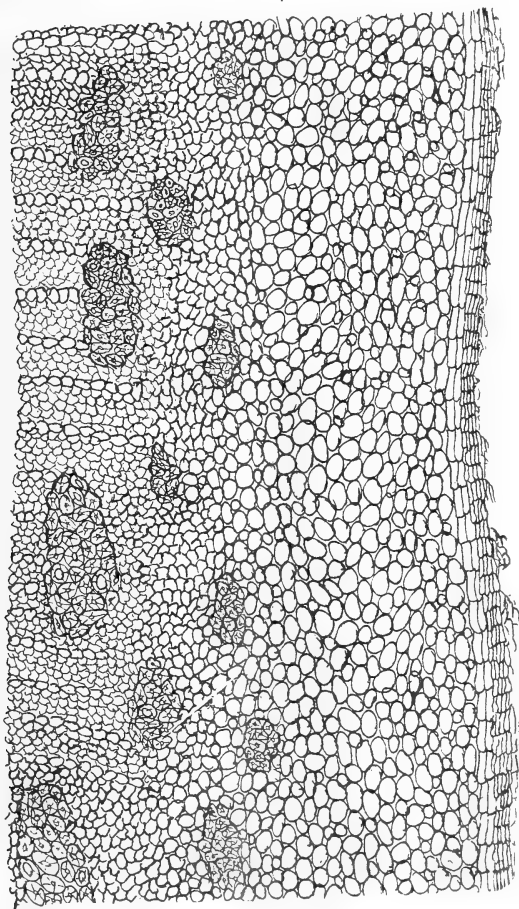
Viburnum prunifolium.
Bark of trunk.
Longitudinal section.

rays. The clusters are also partly or wholly encased in thin-walled crystal cells, each usually containing a single crystal of calcium oxalate. These interrupted bands of bast fibres and stone cells are separated from each other by rather broader bands of soft bast, in which also a few scattered stone cells and bast fibers occur.

Tests by means of ferric solutions show the presence of considerable quantities of tannic matters in the middle bark, in the soft bast and in the medullary rays.

A cross-section of the stem bark of V. prunifolium shows groups

FIG. 4.



Viburnum prunifolium—Bark of root.
Cross-section.

of stone cells somewhat irregularly disposed, but no bast fibres. These groups appear in this section rounded or somewhat elongated in a tangential direction, or sometimes irregular in outline, but in longitudinal view they appear mostly fusiform, and sometimes five or

ten times as long as thick. The component cells are also of large size.

The clusters of stone cells occur both in the middle and in the inner layers of the bark, but are larger in the latter.

The medullary rays, which in this species are also straight and composed of one or two rows of cells, are much less easily traceable than in the former species, because the cells differ little in size and shape from adjacent parenchymatous elements. They are best recognized by means of iodine solution, their cells containing more starch than those of adjacent tissues.

Freely sprinkled through the parenchymatous regions of this bark are cells containing stellate crystalline masses of calcium oxalate, but cells containing single crystals are rare or wanting, and there is no crystal sheath about the masses of stone cells.

Tannin is also present in this bark, but apparently somewhat less abundant than in the former species.

The bark of the young stems or branches differs from that of older ones, in the fact that the stone cells are in smaller groups. This is because in the old bark the earlier formed masses of stone cells have been cut off by the secondary cork formations, and the later formed groups of stone cells in the inner layers of the bark are of larger size than the older ones farther exterior.

The bark of the root of *V. prunifolium* differs from that of the stem chiefly in the fact that its groups of stone cells are farther apart and average somewhat larger in size. The outer bark is also thicker and more spongy in its texture.¹

PHARMACEUTICAL EXAMINATION.

Five grammes of each of the powdered drugs were taken, and, by means of the continuous extracting apparatus, chloroformic extracts were obtained. The amount of the extractive obtained from the two official drugs by this means was quite different, that of the *prunifolium* being nearly twice that of the *opulus*. The physical characteristics of these chloroformic extracts were similar, resin-like, yellow to green in color, sticky to the touch, and having a very

¹ It appears possible to distinguish between the two species, *V. opulus* and *V. prunifolium*, by the presence or absence of stone cells. A further report will be made on this point when some experience has been obtained in practically distinguishing the powders of the two species.

bitter taste. The extractives were then allowed to evaporate down and their solubility in water was taken. Of the *Viburnum opulus* 0.00459 gramme was dissolved, and of the *Viburnum prunifolium* 0.005 gramme, showing both to contain about the same amount of the principles soluble in water. This extractive was of a clear, greenish color and very bitter, that of the *opulus* being the more bitter of the two.

The residues remaining after treating the chloroformic extracts with water were next treated with a small quantity of petroleum spirit and filtered, the total extractive of the *Viburnum opulus* being 0.0834 gramme, and that of the *V. prunifolium* 0.3915 gramme. These figures show a marked difference in the amounts of the fixed oil (?) contained in the two barks. The physical properties of this fatty material from the different barks were similar in most respects. Both were of a pale green to yellow color, rather sticky, showing the presence of a small quantity of resinous matter; hard to saponify, darkened with sulphuric acid, and, in case of the *opulus*, a slight reaction was obtained with hydrochloric acid.

The chloroformic residues which remained, after extracting with water and petroleum spirit, were macerated for two days in 80 per cent. alcohol. The quantity of extractives obtained thereby was, of *Viburnum opulus*, 0.122 gramme, and of the *V. prunifolium*, 0.0375 gramme, showing the extractive of the *opulus* to be considerably larger than that of the *prunifolium*. The physical characteristics were similar. Evaporated to small bulk and poured into acidulated water gave a large precipitate of resin from the solution of *Viburnum opulus*, but scarcely any with the *prunifolium*.

The powdered drugs which had been treated with chloroform were dried and subjected to the action of alcohol for fourteen hours. The quantity of extractive from each was as follows: *Viburnum opulus*, 1.515 gramme, and *V. prunifolium*, 0.969. The only distinguishable point of difference in these extracts was the very astringent taste in that of the *opulus*, which was almost entirely lacking in the extractive of the *prunifolium*. Evaporating to small bulk, and pouring into a large volume of water, a precipitate of resin came down from both solutions, but much larger from the *prunifolium* than from the *opulus*.

The analysis was continued through an alcoholic and aqueous solution of the dregs in turn, and an examination was also made of

all the barks in order to compare them; but as this part of the examination did not yield results which appear of special significance now, they need not be here recorded. The examination of the chloroformic extract proves the most interesting, and is worthy of mention at this time.

TABULATION OF RESULTS.

	V. opul. Per cent.	V. prun. Per cent.
Chloroformic extract	5.98	9.46
	V. op. Per cent.	V. prun. Per cent.
(a) Soluble in water . . . . .	.0918	.100
(b) Soluble in petroleum spirit	1.66	7.83
(c) Resinous matter	2.44	.75
(d) Residue	1.7882	.78

For this comparison of constituents I am indebted to the assistance of Mr. E. E. Cowman, who performed the work under my direction. The figures are his. Work on the proximate analysis of the different specimens is still in progress, and what is here presented must be regarded as preliminary.

These preliminary results seem to justify the hope that a means may soon be discovered by which the different barks may be distinguished even in the state of powder. The practical details for this discrimination are not yet worked out. It is hoped this preliminary report will be a help to those who may desire to offer assistance in perfecting these details.

BALSAM COPAIBA vs. GURJUN BALSAM. —

BY LYMAN F. KEBLER.

For some time considerable unrest has been displayed by several dealers concerning the questionable purity of some of the balsam copaiba in our markets. On comparing the statistics¹ of importations for the past few years, this anxiety is not without foundation. The arrivals from direct sources of this commodity during 1891 amounted to 205,480 pounds; during 1892, amounted to 185,280 pounds; during 1893, amounted to 80,000 pounds; during 1894, amounted to 82,000 pounds; while the annual sales for consumption are estimated at 122,000 pounds. During the latter part of 1894 about 30,000 pounds of gurjun balsam arrived. At the request of Mr.

¹ From Messrs. Stallman and Fulton.

French, of Smith, Kline & French Company, I have investigated the questionable possibility of detecting gurjun balsam in balsam copaiba by the present methods.

Owing to the natural variable composition of balsam copaiba, its purity cannot always be ascertained with absolute certainty. If the variable composition of balsam copaiba was the only obstacle to surmount, our task would not be so difficult, but when we remember that it is practically impossible to secure this article from first hands (in this country only from third hands) we see how uncertain the genuineness of even a sample becomes from which reliable data can be secured. The tests, until recently, at our command, for detecting gurjun balsam in balsam copaiba, frequently made it impossible for the analyst to render an absolute decision as to its presence or absence when less than 25 per cent. was present.

Balsam copaiba is described as varying in color from a pale yellow to a brownish-yellow, is usually quite transparent, but there are varieties that always remain opalescent. Some kinds are occasionally slightly fluorescent. Samples have come into my hand, guaranteed genuine, and an examination proved them so, that were of a dark amber color and highly fluorescent. Balsam copaiba is insoluble in water, but soluble in absolute alcohol, ether, chloroform, benzine, carbon disulphide and fixed and volatile oils. It varies in specific gravity from 0.940 to 0.993 at 15° C.

In order to obtain the most reliable material possible, samples were obtained from several well-known dealers of this article; some were guaranteed pure, while others were represented to be of questionable purity.

Several samples of gurjun balsam were also secured. The dealers appeared somewhat reluctant to furnish this article, either because they were not in possession of it, or did not desire it to become known that they handled it.

The samples were all examined by the most approved methods, which are briefly reviewed below:

TURPENTINE.—When a sample of balsam is heated the odor of turpentine should not be emitted.

FIXED OILS—The residue left after driving off the volatile oil should be transparent, friable and amorphous.

PARAFFIN OIL can be detected by introducing 1 c.c. of the balsam into a test tube containing 4 c.c. of 95 per cent. alcohol,

agitating the mixture well, then suspending the test tube in boiling water until the contents begin to boil; paraffin oil, if present, will separate from the mixture and sink to the bottom, while the balsam is held in solution or in suspension by the alcohol.

GURJUN BALSAM.—Hager's test is as follows: To 3 c.c. of a mixture of 1 part of sulphuric acid and 25 parts of pure acetic ether, add 6 drops of the balsam; after a few minutes the mixture will assume a violet hue, if a large per cent. of gurjun balsam is present, and on standing twelve hours it will change to a dark brown or black color.

A second test is as follows: Dissolve 1 drop of the balsam, to be tested, in 20 drops of carbon disulphide; to this mixture add 1 drop of a cooled mixture of equal parts of sulphuric and nitric acids; mix well. If gurjun balsam is present a red or violet tinge will appear.

GLACIAL ACETIC ACID TEST, due to Messrs. Dodge and Olcott, is executed thus: Place 1 c.c. of glacial acetic acid (99.5 per cent.) into a test tube; to this add 4 drops of pure, concentrated nitric acid (1.42), mix well; then add to this mixture, carefully, 4 drops of the balsam in question; if gurjun balsam is present, a reddish zone will be formed between the layer of balsam and the acid mixture in a few minutes. On mixing the contents of the test tube well, the whole will assume a reddish or purple color. The degree of color varies with the amount of gurjun balsam present.

ACID NUMBER.—A weighed portion of the balsam is dissolved in alcohol, a few drops of phenolphthalein solution added, and titrated with an eminormal solution of caustic potash. The number of mgms. of potassium hydroxide required to neutralize 1 gramme of the balsam is called the acid number.

THE AMMONIA TESTS.—All varieties of balsam copaiba, except para, when mixed with an equal volume of 10 per cent. ammonia water, will form a clear, transparent solution, more readily when warmed. Again, when 1 part of the balsam is mixed with 10 parts of 10 per cent. ammonia water, the resulting mixture should neither gelatinize nor separate a gelatinous substance, even after standing a day.

The accompanying table contains the results of the examination of the samples secured, as well as a few samples of pure balsam copaiba, adulterated by myself with gurjun balsam.

No.	Description.	Am-Test.	Hager's Test.	Sulphuric Acid, Nitric Acid and Carbon Disulphide Test.	Glacial, Acetic and Nitric Acids Test.	Acid Number.
1	Pure.	Normal. ²	No action.	Colorless.	Colorless.	25.69
2	Pure.	Normal.	No action.	Colorless.	Colorless.	34.62
3	Pure.	Normal.	No action.	Colorless.	Colorless.	53.00
4	Pure.	Oil sepa- }	No action.	Colorless.	Colorless.	62.10
5	Pure.	Oil sepa- }	No action.	Colorless.	Colorless.	62.35
6	Pure, P.	Normal.	No action.	Colorless.	Colorless.	40.17
7	{ Pure, Ameri }	Normal.	No action.	Colorless.	Colorless.	56.07
8	Adulter, d. Oil }		Violet color.	Light purple.	Light purple.	35.09
9	Adulter.	Normal.	No action.	Colorless.	Tinge of red.	40.92
10	{ No. 6, ar cent. jun ba }	Normal.	No action.	Colorless.	Light purple.	38.26
11	{ No. 7, ar c. of balsar }	Normal.	No action.	{ Slight tinge of red. }	Light purple.	50.65
12	{ No. 7, ar c. of balsar }	Normal.	{ Very slight tinge of red. }	Light red.	Light purple.	47.95
13	Gurjun, Gelat. }		Purple.	Purple.	Purple.	38.88
14	Gurjun, Gelat. }		Purple.	Purple.	Purple.	1.87

zine. AA. = absolute alcohol.

sulphide. F. and V. = fixed and volatile oils.



No.	Description.	Color.	Fluorescence.	Specific Gravity at 15° C.	Soluble in	Insoluble in	Turpentine.	Fixed Oils.	Paraffin Oil.	Ten Per Cent. Ammonia Test.	Hager's Test.	Sulphuric Acid, Nitric Acid and Carbon Disulphide Test.	Glacial, Acetic and Nitric Acids Test.	Acid Number.
1	Pure	Tinge of yellow.	None.	0.9384	{E., B., CS ₂ , C. and F. and V. oils.	{Water, AA. and Ma.	None.	None.	None.	Soluble. Normal. ²	No action.	Colorless.	Colorless.	25.69
2	Pure.	Light yellow.	None.	0.9416	{E., B., CS ₂ , C. and F. and V. oils.	{Water, AA. and Ma.	None.	None.	None.	Soluble. Normal.	No action.	Colorless.	Colorless.	34.62
3	Pure.	Dark amber.	Highly.	0.9508	{E., B., CS ₂ , C. and F. and V. oils.	{Water, AA. and Ma.	None.	None.	None.	Soluble. Normal.	No action.	Colorless.	Colorless.	53.00
4	Pure.	Dark amber.	Highly.	0.9580	{E., B., CS ₂ , C. and F. and V. oils.	{Water, AA. and Ma.	None.	None.	None.	{Soluble. Oil separated.	No action.	Colorless.	Colorless.	62.10
5	Pure.	Dark amber.	Highly.	0.9530	{E., B., CS ₂ , C. and F. and V. oils.	{Water, AA. and Ma.	None.	—	None.	{Soluble. Oil separated.	No action.	Colorless.	Colorless.	62.35
6	Pure, Para	Light yellow.	Very slight.	0.9499	{E., B., CS ₂ , C., AA. and F. and V. oils.	Water and Ma.	None.	—	None.	Insoluble. Normal.	No action.	Colorless.	Colorless.	10.17
7	{Pure, Central America.	Light yellow.	None.	0.9624	{E., B., CS ₂ , C., Ma. and F. and V. oils.	Water and AA.	None.	—	None.	Soluble. Normal.	No action.	Colorless.	Colorless.	56.07
8	Adult rated.	Amber.	Some.	0.9600	{E., CS ₂ , C., Ma., AA. and F. and V. oils.	Water and B.	None.	—	None.	{Insoluble. Oil separated.	Violet color.	Light purple.	Light purple.	35.09
9	Adult rated.	Amber.	Some.	0.9572	{E., CS ₂ , C., Ma., AA. and F. and V. oils.	Water and B.	None.	—	None.	Soluble. Normal.	No action.	Colorless.	Tinge of red.	40.92
10	{No. 6, and 5 per cent. of gurjun balsam.	Light yellow.	Some.	0.9502	{E., B., CS ₂ , C., AA. and F. and V. oils.	Water and Ma.	—	—	—	Soluble. Normal.	No action.	Colorless.	Light purple.	38.26
11	{No. 7, and 10 per cent. of gurjun balsam.	Light amber.	Some.	0.9503	{E., CS ₂ , C., Ma. and F. and V. oils.	{Water, AA. and B.	—	—	—	Soluble. Normal.	No action.	{Slight tinge of red.	Light purple.	50.65
12	{No. 7, and 15 per cent. of gurjun balsam.	Light amber.	Some.	0.9597	{E., CS ₂ , C., Ma. and F. and V. oils.	{Water, AA. and B.	—	—	—	Insoluble. Normal.	{Very slight tinge of red.	Light red.	Light purple.	47.95
13	Gurjun balsam.	Amber.	Highly.	0.9722	{E., CS ₂ , C., AA. and F. and V. oils.	Water and B.	None.	—	None.	{Insoluble. Gelat. ppt.	Purple.	Purple.	Purple.	38.88
14	Gurjun balsam.	Reddish	Highly	0.9828	{E., CS ₂ , C., AA. and F. and V. oils.	Water and B.	None.	—	None.	{Insoluble. Gelat. ppt.	Purple.	Purple.	Purple.	1.87

¹ Equal parts of ammonia water and balsam.

² Ten parts ammonia water, and one part of the balsam.

E = ether, C. = chloroform, B. = benzene, AA. = absolute alcohol, Ma. = methyl acetate, CS₂ = carbon disulphide, F. and V. = fixed and volatile oils.



The conclusions from the above and other data may be summarized as follows:

(1) The color and the fluorescence or non-fluorescence are of no value.

(2) The wide range of the specific gravity of balsam copaiba makes that factor practically valueless.

(3) The solubility or the insolubility of balsam copaiba are uncertain factors and cannot be relied on. One sample of pure substance is soluble in absolute alcohol, another is not. One sample of benzine will indicate the presence of gurjun balsam, another will not; hence, is valueless as a specific test.

(4) The specific tests for turpentine, fixed oils and paraffin oils are reliable.

(5) The ammonia tests are misleading and are consequently unreliable.

(6) The acid number cannot be relied on. At first the author anticipated valuable results from this source, but was utterly disappointed.

(7) Hager's test is not reliable, especially with less than 25 per cent. of gurjun balsam present.

(8) The carbon disulphide test is fairly reliable with a moderately large per cent. of gurjun balsam. Some varieties of balsam copaiba turn reddish-brown with this test, and it sometimes becomes very difficult to discriminate.

(9) The glacial acetic acid (99.5 per cent.) is perfectly reliable, even when not more than 5 per cent. is present, at least so far as the above results indicate.

The writer has found that gurjun balsam is even more variable in composition than balsam copaiba, consequently an absolute decision is reserved until a thorough test has been made with a fair number of samples. This will be done as soon as sufficient material can be collected.

The U. S. P. instructs us to detect gurjun balsam in balsam copaiba by heating a sample to 130° C., when it will gelatinize if the former is present. Some samples may gelatinize, but a trial proved that the material employed in these experiments increased only slightly in viscosity, not even assuming a semi-gelatinous state. The test is unreliable in toto.

Unless otherwise specified, the dealer will always supply a non-solidifiable product which will comply with every test in the U. S. P.,

and yet it is to be used only for mass copaiba. It seems almost absurd to prescribe a series of tests for a substance intended for a special purpose, and yet cautiously omit the test leading to its identification. A balsam copaiba designed especially for mass copaiba should be subjected to the solidification test.

305 CHERRY STREET,
Philadelphia, Pa.

ON THE DETERMINATION OF MORPHINE IN OPIUM.¹

BY LYMAN F. KEBLER, M.S.

In this article the author contributes some interesting and valuable information in regard to opium assaying, with especial reference to the several methods for obtaining corrections for the amount of impurity associated with the crude morphine.

The crude morphine from thirty opium assays was mixed, and a portion incinerated, a quantitative estimation being made of the ash. 27.88 per cent. of the ash was soluble in water, to which it imparted an alkaline reaction.

The complete analysis showed :

Soluble in H ₂ O (K ₂ CO ₃ , K ₂ SO ₄ , NaCl)	27.88
Silica	0.83
Aluminium phosphate	0.43
Magnesium phosphate	13.45
Calcium carbonate	56.17
Loss	1.24
<hr/>	
Total	100.00

A comparison of the several methods for obtaining corrections, including titration with volumetric acid solution, using various indicators, gave the following results :

Methyl orange	100.02
Cochineal	99.53
Litmus	98.93
Brazil wood	98.47
Haematoxylin	97.59
Ash method	97.59
Lime water method	98.22
Absolute alcohol	98.33

¹ Read before the New York Section Soc. Chem. Ind., in April, and published in the May number of the Journal of the Society, page 464. Abstracted by Charles H. La Wall.

The author gives preference to the various methods in the following order :

- (1) Ash method.
- (2) Titration.
- (3) Lime water method.
- (4) Absolute alcohol.

A comprehensive series of assays was made from one sample of powdered opium, allowing the separation of the crude morphine to take place during periods of time ranging from three to thirty-six hours.

The tabulated results are as follows :

Number of hours allowed for precipitation.	3	5	8	12	16	20	24	28	36
Per cent. of crude morphia in the opium	13'03	14'32	14'35	14'72	14'80	14'81	14'85	14'95	15'17
Per cent. of ash in the crude morphia	0'91	1'33	1'41	1'81	1'90	2'00	2'10	2'63	3'00
Per cent. of pure morphia in the crude morphia by the ash method.									
Based on the above analysis	98'54	97'34	97'35	97'63	96'65	96'28	96'10	95'06	94'45
Per cent. of pure morphia in the opium by the ash method. Based on the above analysis	12'84	13'94	13'97	14'22	14'28	14'26	14'27	14'24	14'32
Per cent. of pure morphia in the crude morphia by the lime-water method.	99'10	98'01	98'21	97'32	96'70	96'40	96'31	95'02	96'21
Per cent. of pure morphia in the opium by the lime-water method	12'91	14'03	14'09	14'31	14'31	14'27	14'31	14'39	14'59
Per cent. of pure morphia in the crude morphia by titration	98'17	97'26	97'56	97'03	96'52	96'31	96'31	95'81	95'02
Per cent. of crude morphia in the opium by titration	12'78	13'92	13'99	14'28	14'28	14'26	14'30	14'35	14'41

According to the above table there is a decided increase both in impurity and morphine as time increases; also an appreciable augmentation is noted in the twelve-hour assay when compared with the eight-hour assay, which immediately precedes it.

The presence of meconic acid, potassium and calcium was established in morphine of three hours' precipitation, and, after appropriate experiments, the author concludes that the addition of the alcohol in the assay process hastens the precipitation of a part of the impurity.

The author thinks that a slight modification of the present process would yield a crude morphine needing no correction, *i. e.*, that the amount of impurity associated with the morphine would not exceed the amount of morphine lost during the operation.

The deposit which forms in the mother liquor, mixed with the wash water, rejecting the alcoholic and ethereal washings, was col-

lected from eight of the above assays after two months' standing. The weight of this precipitate showed an increase of 0.81 per cent. of morphine for the opium, but upon closer examination this precipitate was found to consist of but 54.43 per cent. pure morphine, the remainder being calcium meconate and organic matter.

After three months' standing, an aliquot part of the mother liquor and aqueous washings, free from any sediment, was treated according to Mr. Dieterich's process, and 0.15 per cent. more of morphine was obtained, making the total quantity for the given sample 14.81 per cent. pure morphine.

The author states that he considers a correction unnecessary for a well-executed assay; that is, allowing from twelve to sixteen hours for precipitation and adhering closely to the text, the amount of the crude morphine will not exceed the percentage of pure morphine in the sample.

THE TANNIN OF CINNAMOMUM CASSIA.

BY THOMAS R. THORNTON, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 145.

In a lecture on pharmacy delivered to the Senior Class of this College during the past winter, the lecturer stated that the nature of the tannin present in the variety of cinnamon under discussion at times interfered very much with the process of percolating the drug with aqueous menstrea, and occasionally rendered it almost impossible.

This statement induced the author to undertake the examination of the tannin that is recorded in this paper. But before commencing the investigation of the character of the tannin, it was decided to estimate the amount of the principle contained in the drug. For this purpose three samples of the drug were obtained, and from each lot a decoction was made by exhausting 20 grammes of the powdered article with enough hot water to make 1 litre of liquid when the latter was cool. The tannin contained in these liquids was then estimated by both the hide powder and the gelatin and alum methods, both of which have frequently been described in this JOURNAL.

The following are the results which were obtained; they are stated in percentage and are based on the original drug:

Number of Sample.	METHOD OF ESTIMATION.	
	Hide Powder.	Gelatin and Alum.
1	3'70	3'37
2	3'20	3'83
3	4'80	4'32

In order to isolate the tannin, a quantity of powdered cinnamon was exhausted by maceration and percolation with acetone. From the percolate the greater part of the solvent was recovered by distillation under reduced pressure.

To the concentrated liquid resulting from this operation, successive additions of water were made, until the resinous substances and associated matters were completely precipitated. The mixture was then filtered, the insoluble part set aside and the filtrate shaken with acetic ether, the object being to remove any tannin from the water solution. However, when the layer of acetic ether was separated and distilled there was but a very small residue left. This residue was of a resinous nature. To afford the acetic ether a better opportunity to extract the tannin from the water solution, the latter was saturated with sodium chloride. But a repetition of the agitation with acetic ether after this treatment did not serve to remove tannin.

Having cognizance of the possibility of a co-precipitation of the tannin with the resin of the drug when the concentrated acetone percolate was mixed with water, the author resorted to the precipitate which was produced by the addition of water, the insoluble part of the extract which he had set aside. This was dissolved in acetone, the solution diluted with water and afterwards saturated with sodium chloride.

The outcome of this treatment was a reddish-brown plastic mass, which separated in the layer of brine and a supernatant layer of acetone. The latter was removed, but no residue of tannin was obtained when the solvent was recovered.

This last described attempt to isolate the tannin having proved futile, it was decided to try the extraction of the tannin from the drug by the use of hot water—a solvent which would remove at most but mere traces of resin. Accordingly, a decoction was prepared in this manner. It was shaken with acetic ether, the mixture

at once saturated with sodium chloride, after which it was allowed to stand at rest for the acetic ether to separate. But no tannin was obtained when the layer of this solvent was removed and evaporated.

The failure of these methods to effect a solution of the tannin in water indicates clearly the phlobaphene character of that principle.

The fact that the astringent principle originally possessed this property of slight solubility in water, or acquires the same in the course of manipulation, seems alone sufficient to mark a relationship of the tannin of this species of cinnamon to that class of these compounds which are so well typified by the tannin of the oak barks; but that this relationship might be further inquired into, some of the insoluble substance, which was set aside, was dissolved in alcohol, and the deep wine-red solution which resulted was tested with the reagents named in the subjoined table.

The reactions given by the tannin of white oak bark and by gallotannic acid, when in water solutions, are supplied in the table, that the similarity of the tannin under consideration to the former and its dissimilarity to the latter may be the more manifest :

Reagent.	Cinnamon Tannin.	White Oak Tannin.	Gallotannic Acid.
Copper sulphate and Ammonium hydrate	Brownish-red ppt.	Precipitate.	No ppt.
Bromine water	Dirty-green ppt. Brownish-yellow ppt.	Brown-green color. Yellow ppt.	Brown ppt. No ppt.
Ferric chloride	Ppt., blackish-green color.	Green color and ppt.	Blue color and ppt.
Ammonio-ferric sulphate	Blackish-green ppt.	Green color and ppt.	Blue color and ppt.
Lime water	Ppt., turning brown- ish.	Ppt., turning pink.	Ppt., turning blue.
Lead acetate	Brick-red ppt.	Pale yellow ppt.	White ppt.

To learn the effect of the action of fused alkali on the tannin, some of the alcoholic solution of it was poured into water and the precipitate which was produced was collected on a filter, washed and allowed to drain. It was then added to fusing potassium hydrate, in which it dissolved with effervescence and the exhalation of a peculiar odor, one which was suggestive of that noticed in soap-making. After being allowed to cool, the mass was dissolved in distilled water. The solution was slightly acidified with diluted sulphuric acid, and without filtration agitated with ether U. S. P. The ether layer was removed and the sol-

vent recovered. The residue was treated with distilled water and the solution filtered. In order to further purify the product of the action of the fused alkali, it was removed from the last solution by agitation with ether, as before. The residue left upon the evaporation of the ether was dissolved in water, and in this solution the following reagents indicated the presence of proto-catechuic acid.

Ferric chloride, green color, slight ppt.,
and

Sodium carbonate, red color.

Ferrous sulphate, in neutral solution, purple color and ppt.

Lead acetate, yellow ppt.; filtrate gave a slight ppt. with lead oxyacetate.

Ammoniacal silver nitrate, reduced.

Fehling's solution, reduced.

Lead oxyacetate, yellow ppt.

Pine wood and

Hydrochloric acid, } No violet or red color (absence of phloroglucol).

The inference the author draws from this investigation is that the tannin principle of *Cinnamomum Cassia* is either a phlobaphene as it exists in the drug, or that it acquires a phlobaphene character when brought into contact with water. In either case, the presence of such compounds could be expected to contribute a large part of the difficulty experienced in percolating the drug with aqueous menstrea.

A NEW PROCESS FOR THE PREPARATION OF SOLUTION OF POTASSIUM ARSENITE, U. S. P.

BY ANDREW CAMPBELL, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 146.

With the object of practically ascertaining the value of a suggestion of Garraud, in the *Bulletin de la Société de Pharmacie de Bordeaux*, in regard to a rapid method for the preparation of Fowler's solution, the experiments described below were undertaken by the author.

But before taking up the consideration of the proposed method, it might be well to review the methods which have been so long in vogue, so that their features will be fresh in mind.

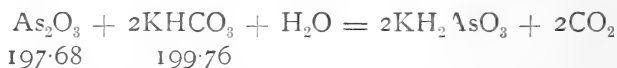
The official method of the United States Pharmacopœia of 1890 for the preparation of solution of potassium arsenite, is to boil 10

grammes of arsenous acid and 20 grammes of potassium bicarbonate with 100 c.c. of water, until solution is effected, when cold, water is added to make 970 c.c., and then 30 c.c. of compound tincture of lavender.

It is to be noted in this formula that the amount of potassium bicarbonate is double that of the Pharmacopœia of 1880. The weight directed by the present authority practically agrees with the quantity required for a reaction, which may be represented thus :



The view generally taken, however, as to the nature of the arsenical salt present, is that it is a mono-potassium arsenite, the reaction being :

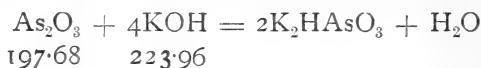


And with the quantities required for this reaction those which were stated in the Pharmacopœia of 1880 practically coincide.

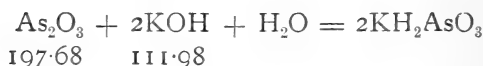
It is, of course, well understood that neither of these reactions are fully realized, and upon testing a volume of 20 c.c. of a freshly-made official solution (in the production of which 400 gramme of potassium bicarbonate had been used) in a carbon dioxide apparatus for excess of carbonate undecomposed by the action of the arsenous acid, a loss of .115 gramme of that gas was experienced. The same process was carried out, with varying results, upon solutions which had been kept for longer periods, but the evidence was abundant proof of the fact that solution of the arsenic trioxide can take place even before boiling has converted all of the potassium bicarbonate into carbonate.

Garraud's recommendation consists in the use of potassium hydrate instead of the potassium carbonate directed by the French Codex, or the purer salt, potassium bicarbonate, ordered in the United States Pharmacopœia.

The reactions would then be expressed as follows :



or,



By the first of these reactions, 10 grammes of arsenous acid would require 11.329 grammes of potassium hydrate, while by the second 5.665 grammes would be needed, in both cases the amounts being calculated by proportion. Since the potassium hydrate of the market is of uncertain strength, the definite weight required cannot be adjusted without resorting to a valuation of the article. In view of this existing condition, a convenient way to supply the necessary quantity of the alkali would be to add the requisite amount in the form of a solution of known strength, as, for example, a normal volumetric solution (55.99 grammes of KOH in 1,000 c.c.).

If a normal volumetric solution was to be used, 10 grammes of arsenous acid would require, for the fulfilment of the reactions, 202 c.c. and 101 c.c., respectively.

That the reaction involving the smaller amount of alkali might be accomplished, 10 grammes of arsenous acid were added to 101 c.c. of normal potassium hydrate volumetric solution, in which it dissolved completely on slight agitation, and without the necessity of applying heat. To this solution was added sufficient water to make 970 c.c., and then 30 c.c. of compound tincture of lavender. The product of this rapid and easy method was correct in arsenical strength, this fact being established by the results of an application of the pharmacopœial process of estimation, while in physical appearance and stability it was identical with the product of the official directions. An objection which may be urged against the general use of this process is that, although it is easy and rapid, the average pharmacist may not have at hand the apparatus necessary for adjusting a potassium hydrate solution to a known strength. But any such difficulty can be obviated by making use of the official liquor potassæ, instead of the normal volumetric solution, in which to dissolve the arsenous acid. The strength of liquor potassæ is stated by the Pharmacopœia to be about 5 per cent., and that of the normal volumetric solution is practically 5.6 per cent. When 10 grammes of arsenous acid were added to 100 c.c. of liquor potassæ, it was found to dissolve as readily as did the same amount in 101 c.c. of the normal volumetric solution.

In order to determine the limit of this ready solubility an excess of arsenous acid was added to some liquor potassæ, the mixture agitated for a few minutes and then filtered. Five cubic centimetres

of the filtrate were titrated with decinormal iodine volumetric solution in the presence of an excess of sodium bicarbonate. This volume was found to contain .699 gramme of arsenous acid. In the same proportion 10 grammes of arsenous acid would require 71.5 c.c. of liquor potassæ. The difference between this amount and that indicated above (100 c.c.) would amply allow for any defect in the strength of the liquor potassæ, and would insure the complete solution of the arsenous acid under all circumstances.

The arsenous acid used should, of course, be pure and, as generally recommended, that in mass should be obtained and powdered as required, for the best samples of commercial powdered arsenous acid were found during the course of these experiments to be only of about 93 per cent. purity.

In connection with this subject eight commercial samples of Fowler's solution were examined by the pharmacopœial method of assay. Two of the samples were from an inland city, five from retail druggists of Philadelphia, and one from a wholesale drug house of the same place.

The results are indicated in the amount of decinormal iodine volumetric solution required by the official method of estimation, and also in percentage comparison with the official requirement of arsenous acid.

Number.	C.c. of $\frac{N}{10}$ Iodine Solution.	Percentage Comparison.
1	48.8	98.79
2	48.7	98.64
3	48.1	97.42
4	48.6	98.44
5	45.0	91.14
6	49.0	99.24
7	498.9	998.28
8	50.2	100.40

These figures were all verified by duplicate titrations, and in the case of No. 7 recourse was had to a gravimetric determination of the arsenous acid to insure accuracy.

The excessive and dangerous strength of this sample is significant in showing that too much care cannot be exercised in the manufacture of even the galenicals of the Pharmacopœia.

The arsenous acid being present in practically ten times the proper amount leads to the suggestion that the error may have occurred in an attempt to translate from the metric to the customary system, in the absence of a proper outfit of metric weights and graduates.

NOTES ON SOME SAPS AND SECRETIONS USED IN PHARMACY.

BY P. L. SIMMONDS, F.L.S.

[Concluded from p. 328.]

Pinus species. Very many species of *Pinus* yield volatile oils used in pharmacy. Among others, *P. palustris*, Ait, or *P. pinaster*, *P. Tæda*, *Pinus sylvestris*, Lin., *P. Pumilio*, Hank., the *P. Mugus*, Scop., and others.

Pinus Abies, Lin., *P. Picea*, Du Roi, *P. vulgaris*, *Abies excelsa*, Dec., the silver fir.—This species furnishes the oleo-resin known as Strasburg turpentine, which resembles common turpentine, but has a more agreeable odor.

P. balsamea, Lin., *Abies balsamea*, Marshall, *A. balsamifera*, Michx.—The balsam fir yields the well-known oleo-resin, Canada turpentine, which is exported from Quebec in kegs or large barrels. Canada balsam is used for medicinal and manufacturing purposes. It is an ingredient in blistering paper and flexible collodion. It is highly valued and much employed as a menstruum for mounting microscopic objects, and makes a fine, transparent varnish for water-color drawings, which does not become darker with time.

P. Australis, Michx., *P. palustris*, Mill.—This is the most valuable of all the American pines. From it are obtained the American "Thus," the concrete turpentine, the volatile oil from turpentine, and the resin. There are three principal descriptions of turpentine known in commerce, American, Bordeaux and Russian. Bordeaux, from *P. pinaster*, Ait.; Russian, from *P. sylvestris*, Lin.; Chian, from *Pistacia Terebinthus*, Lin.

P. Canadensis, Lin., *Abies Canadensis*, Michx. and DeC.—The hemlock spruce furnishes the concrete turpentine known as Canada pitch, which is official in the United States. It is slightly stimulant, like Burgundy pitch, and employed for similar purposes. A volatile oil is obtained from the leaves, which produces dangerous

effects. The inner bark, being a powerful astringent, is used medicinally in America, but its chief application is for tanning. The young shoots are used in making spruce beer.

Turpentine is the general name for the oleo-resinous exudations of coniferous trees, which flows in the crude state from incisions made in the stems. The turpentines, as a rule, are yellowish-white, very viscid, transparent or translucent masses, of honey consistence and of acid reaction; of a peculiar, strong, mostly unpleasant odor, and generally of a burning, aromatic, bitter, disagreeable taste; they consist chiefly of resin and volatile oil. When distilled, this oleo-resin yields the volatile oil or "spirit of turpentine." England imports from 420,000 to 520,000 cwt. of oil of turpentine, in barrels of 2 to 3 cwt., chiefly from the Southern States. Its medicinal properties are stimulant, diuretic, occasionally diaphoretic and anthelmintic. In large doses, purgative, sometimes causing nausea, vomiting and intoxication. Previous to 1846, the tariff of Great Britain was such as to exclude imports of spirits of turpentine and resin.

Turpentine especially affects the kidneys and the mucus of the genito-urinary organs. Externally rubifacient, employed as a liniment in chronic affections. The yellow, translucent resin, the residue of the distillation of the turpentines, is important as an ingredient of plasters and ointments, which are employed as stimulant applications to indolent and ill-conditioned ulcers.

Picea vulgaris, Link., in the north of Europe, furnishes a quantity of resin, from which different products are obtained, among others, pitch. From *Larix Europæa* is obtained the resinous extract known as Briancon, or Venice turpentine, employed in consumption.

From *P. pinaster*, Ait., *P. maritima*, Poir. and Dec. (the cluster pine), Galipot is obtained, also known as "Barras." It is employed, like American "Thus," in the preparation of certain plasters. The annual production from a tree ranges from 5 to 8 pounds.

P. religiosa, H. B. K.—The turpentine produced by this tree is similar in properties to the Venice turpentine. The local name of this tree in Mexico is Oyatmetl.

P. sylvestris, C. Bauhin.—Tar is procured by the destructive distillation of the fir in Northern Europe and America. That used in North America is chiefly obtained from *P. palustris*, Mill. (*P. Aus-*

tralis, Michx.). The tar obtained in Europe is generally considered superior to that of America. The imports of tar into the United Kingdom were, in 1892, 132,000 barrels, and in 1893, 102,216 barrels, of about 30 gallons each. Tar acts as a stimulant, diuretic and diaphoretic, but is not much employed in medicine. It may be used internally in chronic catarrhal affections, and complaints of the urinary passages, also for some chronic skin diseases. Tar water used to be popular in England as a medicinal drink, and in France in most of the Duval and other cheap restaurants, gallons of "Eau de Goudron" are drank daily.

A kind of barrillin is prepared from the cambium sap of this pine. An oily substance, called "fir-wool spirit," has been introduced from Germany, recommended for external use in rheumatism, neuralgia, etc.

P. Larix, Lin., *Abies Larix*, Lamarck., *Larix Europæa*, Dec.—Larch bark is considered to be stimulant, astringent and diuretic. This tree furnishes Venice turpentine, the properties and uses of which are the same as those of the other turpentine.

P. nigra, Ait., when tapped, yields the essence of spruce, an infusion of which, with the leaves and branches, in water, sweetened with molasses, makes the chowder, or black beer, used by the fishermen of Newfoundland as an antiscorbutic.

P. Picea, Du Roi, *P. Abies*, Lin.—The resinous exudation from the spruce fir, commonly known as Burgundy pitch, is obtained chiefly in Finland and the Black Forest. It is a useful application as a plaster to the chest in chronic coughs and other pulmonary affections, to the loins in lumbago, and to the joints in rheumatism.

P. Taeda, Linn.—The oldfield, or frankincense, a fine American pine, furnishes similar products to *P. sylvestris* and *P. Australis*. It yields turpentine in good quantity, though of inferior quality, and exudes much resin.

P. Teocot, Schlecht.—The Brea turpentine produced resembles that of Bordeaux. It yields 17 per cent. of essential oil. The tree abounds in the mountains that surround the valley of Mexico, and in some other localities in that country. Its local name is Ocoto.

Pistacia Lentiscus, Lin.—This and *P. Atlantica* furnish the gum resin of commerce known as mastic. The largest consumption is in the east of Europe, where it is universally chewed like chicle gum in America, and thence derives its popular name. The women

of Scio, Smyrna and Constantinople have almost always a piece of mastic in their mouths. It is asserted to be effectual in whitening the teeth, strengthening the gums, and sweetening the breath. Hence it is used by dentists, and also the inferior kinds for making varnishes, and is one of the ingredients in fumigation. It is obtained in the Greek archipelago, by making incisions in the bark of the tree. When good it occurs in pale yellow, brittle, transparent drops, of an astringent taste, slight agreeable odor, especially when heated. Such as inclines to black, green, or is dirty, should be avoided. The principal revenue of Chios, or Scio, is derived from this gum resin, of which some 4,000 to 5,000 cwt. are obtained. The picked first quality is sent to Constantinople, France and Austria, in small cases. Very little comes to England, only a few cases. The second and third qualities are used in the manufacture of mastic raki, a liqueur made with spirit, mixed with pulverized mastic, which is boiled and cooled. About 200,000 gallons of this are exported annually from Scio.

Pistacia Terebinthus, Linn.—The Chian turpentine of commerce was obtained from this tree in Scio. The produce was under 1,000 lbs. a year. As a medicine it is now obsolete. It is chiefly used in Greece and other parts of the Levant, for preserving wine, and flavoring the spirituous cordial called Raki.

A resinous gum called Alk or Lik (whence the word Lac), flows so abundantly from the trees, even without incision, in Algeria, that it is often dangerous to sleep under them. It is supposed that this tree would yield good terebinthine.

The resins of Algeria are those from the teribinth cedar, juniper, *Pinus halepensis*, Mill. (of which there are large forests), *Thuya articulata*, Vahl., sandarac and mastic.

Pluchea balsamifera, Less. *Blumea balsamifera*, Dec. *Conyza balsamifera*, Lin.—This Eastern shrub has diaphoretic and expectorant properties, in lung diseases. It is the source of a kind of camphor known as Ngai, exported from the Chinese port of Hoïhow, in the island of Hainan, to the extent of about 15,000 lbs. annually. The crude camphor is refined at Canton, and is then known as Ngai-pün, and about 10,000 lbs. are exported yearly from Canton.

Plumeria phagadæmia, Mart.—The milky juice is used in the Amazon valley of Brazil as a vermifuge, administered in coffee, with castor oil. It is also applied externally in rheumatism, and for the cure of ulcers, boils, dislocations, etc.

Populus balsamifera, Linn.—The leaf buds of this species, and of *P. nigra*, Lin., are gathered for medicinal purposes. Their resinous secretion is said to be diuretic and antiscorbutic. It is used to prevent rancidity in ointments, but paraffin is equally effectual.

Mimusops globosa Gaertner, Chicle gum, exudes from this and another species in Mexico, and is largely collected, being used in the United States for chewing. The exports from Mexico in 1892 were to the value of over \$476,000.

Prosopis dulcis, H. B.—Mezquite is used in the preparation of mucilage, gum-drops, jujube-paste, etc. The gum, which exudes from the trunk and branches, is very soluble in water, and forms, when dissolved, a demulcent of a sweet, creamy and agreeable taste, but souring more readily, and probably containing a larger proportion of tannic and gallic acid than gum arabic.

There are vast forests of the mezquite trees, embracing millions of acres, in the southwestern part of Texas. The process of gathering the gum is simple. The outside bark of the tree is scraped off, and the gum begins to exude and form in icicle-shaped masses, and, after one day's exposure in the autumn, is dry and hard enough to collect. Its color, however, unfits it for pharmaceutical purposes.

Prunus spinosa, Lin.—The acid, astringent juice of the fruit (the sloe), inspissated over a slow fire, has been used in France as a substitute for catechu. The leaves have that peculiar flavor which exists in *Spiræa ulmaria*, the American *Gaultheria*, and some other plants, which resembles the more delicate perfume of green tea, and hence they were said to be used as adulterants of tea. A water distilled from the blossoms is used as a medicinal vehicle in some parts of the continent.

Pterocarpus marsupium, Roxb. The reddish gum resin which exudes from the bark of this tree forms one of the best kinos of commerce, containing about 75 per cent. of tannic acid, and has been known in Europe for upwards of a century. It is the dried sap which exudes copiously, on the stem being artificially wounded. It becomes brittle on hardening, and is very astringent. It is exported in considerable quantities from Malabar. Another kind of kino is from *Butea frondosa*. Nearly all the Australian *Eucalypti* exude astringent gum resins in considerable quantity, resembling Kino in appearance and property. Kino is commonly used in

medicine for its astringent properties, especially in diarrhœa, chronic dysentery and other such cases.

P. Santalinus, Lin.—The essential oil of nosandus wood, or “sandalwood,” as it is sometimes called, is prescribed for gonorrhœa. This tree also yields a kind of dragon’s blood.

Rhus Metopium, Lin.—This tree is known in the West Indies as the false hog gum tree. From the bark, when wounded, a transparent juice exudes, which is used on plasters as a substitute for Burgundy pitch, also in medicine as a substitute for balsam of copaiba. The milky juice of some other species of *Rhus*, especially of *R. radicans*, Lin., a variety of *R. Toxicodendron*, Michx., is exceedingly poisonous.

Saccharum officinarum, Lin.—One-half of the sugar now made in the world is produced from beet root, which, however well prepared, is inferior to that obtained from the sap of the sugar cane. The latter alone is prescribed in the Pharmacopœias; it is demulcent, given in catarrhal affections, in the form of candy, syrup, etc. It is also employed in pharmacy to render oils miscible with water, and enters into the composition of several mixtures and pills, and all the confections, syrups and lozenges.

Molasses is the drainage from raw or muscovado sugar. It is sometimes sold as “golden syrup.” Treacle, which is darker and thicker, is that which drains from refined sugar in the moulds. Treacle is slightly laxative, and is used in pharmacy to give cohesiveness to pill masses. To persons disposed to dyspepsia and bilious habits, sugar in excess becomes more hurtful than otherwise. Sugar, when concentrated, is highly antiseptic, and, from a knowledge of its possessing this principle, it is frequently employed in the preservation of vegetable, animal and medicinal substances. In cases of poisoning by copper, arsenic, or corrosive sublimate, sugar has been successfully employed as an antidote; and white sugar finely pulverized is occasionally sprinkled upon ulcers with unhealthy granulations.

Salix tetrasperma, Roxb.—At the commencement of the hot season in India, the upper surface of the leaves of this tree are occasionally covered with a sugary exudation, which dries up in thin white flakes to a sugar or manna. The same trees often yield this exudation several years in succession, but it appears to be confined to a few trees and is not common. Two or three other species of

Salix have also been observed to yield a saccharine exudation—*S. fragilis*, in Persia; *S. Chilensis*, in Chili, and a species in the Punjab.

Styrax benzoin, Dryand.; *Benzoin officinalis*, Hayne; *Lithocarpus Benzoin*, Blume.—Benzoin, known in commerce as “Gum Benjamin” is an odoriferous or balsamic gum resin, an exudation from the stem of trees in Siam and Sumatra, and imported in small chests of $2\frac{1}{2}$ cwts. These two qualities are chiefly used in medicine; the one in tears from Siam, and the other, in agglutinated masses from the far East. The former is the purest and has the strongest odor. Its medicinal properties are stimulant, expectorant and styptic. It is used also in perfumery, for incense, and in making aromatic pastilles, coating court-plaster and for healing wounds.

The imports into London were, in 1891: 3,464 chests; 1892, 2,655 chests; and in 1893, 3,163 chests. Benzoin was formerly employed in chronic bronchitis and dysentery, but is now chiefly used in the tincture known as “friar’s balsam,” as a styptic and stimulant to wounds and old ulcers. Benzoic acid is stimulant and diuretic, and also a valuable antiseptic.

Tabashur, a word of Sanscrit origin; Tavakshiri meaning cow’s milk. This secretion is procured from the joints, or internodes, of the female bamboo, *Bambusa arundinacea*, W. It so far resembles silex as to form a kind of glass when fused with alkalis. It is also unaffected by fire and acids. It is called “bamboo salt,” and is employed medicinally in the East as a tonic and astringent in the cure of all sorts of paralytic complaints, flatulencies and poisons. This hydrate of alumina is often found in the soil where a plantation of bamboos has been burnt. P. Smith gives the following analysis of its composition:

Silica	90°50
Potash	1°10
Peroxide of iron	0°90
Alumina	0°40
Water	4°87
Sap	2°23
	<hr/>
	100°00

Beesha Rhudii, Kunth. (*Melocanna bambusoides*, Tim.), yields more or less of the Tabashur; sometimes, it is said, the cavity is nearly filled with this silicious crystallization.

Toluifera balsamum, Lin.; *Myroxylon Toluifera*, H. B. K.; *Myrospermum toluiferum*, A. Rech.—There are many other synonyms of this tree.

There is great confusion yet as to the origin of the two balsams, Peru and Tolu. The exudation known as “balsam of Tolu” is obtained by incisions in the trunk. When in the first state it is thickish, yellow, becomes slowly darker and solid, and has a very pleasant odor and an agreeable taste. It is chiefly obtained in New Granada, and exudes only from the tree during the heat of the day. The tree inhabits the mountains and banks of the River Magdalena. The balsam, which contains cinnamic acid, is used as a stimulant expectorant, and for flavoring by confectioners and perfumers. It is largely imported into the United States, the imports averaging 42,000 pounds in the three years ending 1890. In the form of lozenges it is a popular and agreeable remedy for appeasing troublesome coughs, and gives a pleasant odor to lip salve.

Toluifera Pereira (Roxb.) Baillon; *Myroxylon peruiferum*, Lin. *fl.*; *Myrospermum Salvatoriense*.—This balsam tree, like Tolu, has received many synonyms from different authors. The balsam is a beautiful tree, averaging 100 feet in height and 20 inches in diameter. It grows almost exclusively on the coast of Salvador, comprised by the southern shores of the departments of Sonsonate and Libertad. It is known locally as quinquino, or white balsam, when first obtained, but this name is also given to a balsam from the pressed fruit. It is a transparent deep reddish brown, or black liquid, similar in color and consistence to dark molasses, smells vanilla-like, but somewhat empyreumatic, tastes a little bitter, sharp and burning.

There are two methods of extracting the liquid. The first consists in scraping the skin of the bark to the depth of one-tenth of an inch with a sharp machete in small spaces some twelve to fifteen inches square, all along the trunk and stout branches of the trees. Immediately after this operation, the portions scraped are heated with burning torches made out of the dried branches of a tree, and after this pieces of old cotton cloth are spread on the warmed and half-charred bark. By punching the edges of the cloth against the tree with the point of the machete, they are made to adhere. In this condition they are left for twenty-four and even forty-eight hours, when the rags are gathered and submitted to a decoction in

large iron pots. After this the rags are subjected, while still hot, to great pressure in an Indian machine made of strong ropes and wooden levers worked by hand. The balsam oozes out and falls into a receptacle, where it is allowed to cool. This is called raw balsam. To refine it they boil it again and drain it, after which they pack it in iron cans ready for market. The other method of extracting balsam consists in entirely barking the trunk and heavy branches of the tree, a process which, as a rule, kills it outright, and at best renders it useless for several years. The bark is finely ground, boiled and submitted to pressure in order to extract the oil, which is considered of an inferior quality to that obtained by the system first described. Both methods are defective, but the latter is ruinous, and is forbidden by the authorities. The name of "Peruvian balsam" was given to this article because it was first sent from Salvador to Peru, in the time of the Spaniards, and from Callao reshipped to England.

About 6,000 pounds of the balsam go to the United States annually. Thirty years ago, many thousand pounds of it were received in England, but the imports there rarely exceed now 2,000 pounds. It is a warm and stimulating tonic and expectorant, useful in chronic catarrh, asthma and other pectoral complaints and rheumatism. Externally it is much used in Europe, in the treatment of scabies, as being equally effective, and more agreeable than sulphur in its application.

The balsams of Tolu and Peru are employed occasionally medicinally in the state of syrup or tincture, particularly in cough mixtures; their fragrance also renders them pleasant adjuncts to chocolate, liqueurs and other articles.

Balsam of Peru is seldom met with in commerce unadulterated. The best test is its specific gravity, which ought to be between 1.14 and 1.16. The difficulty of taking the specific gravity is best overcome by making a solution of one part of chloride of sodium in five parts of water, the specific gravity of which is 1.125. In this liquor a drop of Peru balsam, if pure, ought to sink down. (Other tests were given in Vol. 66, p. 100.)

Uncaria Gambir, Roxb. *Nauclea Gambir*, Hunter.—This plant yields the extract known as pale catechu in pharmacy, which is largely imported into Europe from Singapore, under the commercial name of Gambier, and frequently under the old erroneous designa-

tion of "Terra japonica." It is like cutch, a powerful astringent, useful chiefly in diarrhœa. Lozenges are said to be the best medium of administering it in relaxed condition of the throat, uvula and tonsils, in sponginess of the gums, salivation, etc. They may be employed in pyrosis and other cases in which astringents are indicated. This extract contains only about half the astringent matter of that obtained from the trunk of *Acacia Catechu*. (Tests to determine the two are given, Vol. 66, p. 105.).

The exports from Singapore average over 40,000 tons, of which more than half comes to England, to be chiefly used by tanners and dyers, and about 13,000 tons to the United States.

Unona Narum, Dun.; *Uvaria Narum*, Bl.; *U. Zeylanica*, Lam.—A greenish, sweet-smelling oil; is obtained in Malabar by distilling the roots of this evergreen climber, which is used medicinally as a stimulant in rheumatism. The seeds are carminative.

Vateria indica, Lin.; *Elæocarpus copallinus*, Retz.—The resin from this tree is the white dammar, or Indian copal, known also as "piney varnish." Under the influence of gentle heat, it combines with wax and oil, and forms an excellent resinous ointment.

Xanthorrhœa Tatei, Mueller.—This, one of the largest of the so-called "Australian grape trees," furnishes the "black-boy gum," a balsamic resin of a bright yellow color and pleasant fragrant odor, when burned as incense. It is used for the manufacture of sealing wax, and picric acid (which it yields in large percentages), and for varnishes. It is also known as "gum acroides." It tastes slightly astringent and aromatic, like storax or benzoin, containing benzoic and cinnamic acids. This resin is also commercially obtained from *X. resinosa*, Persoon; *X. quadrangulata*, Mueller, of South Australia; *X. Preissii*, Endlicher, of West Australia, and *X. hastilis*, and *X. Australis*, R. Brown, of New South Wales.

NOTES ON THE COMMERCE IN VEGETABLE OILS.

BY P. L. SIMMONDS, F.L.S.

All plants do not yield oil, but still the list of oil producers is an extensive one. The richest are the cruciferous tribe, and some of the palm fruits. All oils are not good for food or light, some of them being what are termed "drying oils."

The quantity of oil yielded varies, not only in different species, but according to climate and culture. Roughly it may be assumed that oily nuts yield half their weight; colza seed two-fifths; hemp seed one-fourth, and linseed from one-fourth to one-fifth.

Some oils are employed for food, others are burned in lamps; some form the basis of soap, or are used as lubricants, not to mention their employment in painting, in perfumes and many other economic purposes.

In the manufacture of woollens from 10 to 15 per cent. of oil is required. For the finer kinds of wool, olive and ground-nut oils are used, while for the coarser kinds rape is employed.

The largest source of vegetable oils is the small seeds of plants, and some of them are used for food. The seed of the cotton plant, gingilie, mustard, linseed and rape seed may be quoted as illustrations of those products, and oils of a very fine quality are procurable from them. The seeds of the common cucumber and those of other cucurbita may be especially cited as yielding an edible oil of delicious and delicate taste, and that of the large cucumber, grown on the slave coast, far exceeds in flavor the finest olive oil.

Seed oil is more commonly eaten in India and other hot countries than in England. The seeds of the safflower and the sesamum oils may be added to the list, as representing Indian oils, which are used in cooking grain and other vegetables; whilst in the gloomy forests of Central Africa and in the great mangrove swamps, where the cassava, plantain and yam are the chief foods, palm oil and vegetable fats are almost necessities of life.

In a work which I helped Dr. Edward Smith to bring out some years ago, "On Foods," he observes: "There can be no doubt that we have in this product of seeds of plants, which seem otherwise to be useless, a great storehouse of most valuable nutritive material; and if we know but little of many of them in this climate, it is because we have the olive oil at hand, and are bountifully supplied with many kinds of animal fats. It is, however, probable that the cheapness of some of these vegetable oils, in addition to the delicacy of their flavor, will, ere long, force themselves into notice and obtain a place among our foods."

In China there are a number of edible oils used which do not appear in English commerce, and they have even some mode of purifying castor oil to remove its drastic properties. The enormous

demand for oil there, as an article of daily diet, to counteract the binding qualities of rice and other cereal foods in pastry-making, etc., has led to the manufacture of oil from all sorts of sources.

Vegetable fixed oils are usually contained in the seeds of plants, though olive oil and palm oil are extracted from the pulp which surrounds the stone. They are commonly of a thickish consistence and unctuous feel, and differ from volatile oils in leaving a greasy stain on paper, which cannot be removed by heat alone. They are sometimes colorless, occasionally of a greenish or yellowish hue; when pure, semi-transparent, with little smell and a mild taste.

Fixed oils are those which require an intense heat before they give out vapor. The fixed vegetable oils are chiefly expressed, the seeds or raw material being previously ground or bruised, and the pulpy matter subjected to pressure in hempen bags; a gentle heat being generally employed at the same time, to render the oil more liquid. Those which retain their transparency after they have become solid, as linseed, nut, poppy and hemp seed, are called *drying oils*, while others which assume the appearance of tallow or wax and become opaque, as olive, almond, rape and benne are called *fat oils*.

The former are mostly used for paints, varnishes and printers' ink; the latter are consumed as food, in medicine, soap-making and other branches; several of each kind being likewise extensively employed in the arts and in the lubrication of machinery. The division of oils into drying and non-drying is due to the oleine which alters in oxidizing. The product of this alteration is, in non-drying oils, an acid of a disagreeable odor, which irritates the throat; in the drying oils it forms an actual resin.

India and Africa are the chief producing countries of oil-yielding plants. There are over 300 plants known in India to yield oils or perfumes, while those of many other countries also furnish fixed or volatile oils. Some are, however, not articles of any commercial importance.

The port and town of Marseilles, from its facilities for obtaining supplies from Africa and India, is regarded as the principal European centre for oil-crushing and the utilization of oils.

The receipts of oil seeds and their manufacture at Marseilles, in 1887 and 1893, were as follows, in metrical quintals of 2 cwt.:

	1887.		1893.
	Oil Seeds.	Oil Made.	Oil Seeds.
Ground-nuts	785,280	265,000	1,225,290
Castor	214,090	88,000	12,820
Colza	43,830	5,700	54,100
Copra	71,650	109,000	466,340
Cotton	235,950	46,800	182,170
Linseed	73,400	20,500	108,430
Mowra (<i>Basin</i>)	52,000	19,300	120,390
Niger	6,850	2,050	19,940
Palm-nuts	300,000	132,000	188,060
Poppy seed	46,050	17,000	36,890
Ravisons (Mustard)	12,780	600	12,000
Sesame	878,630	396,000	1,188,460
Other seeds and oleaginous fruits	47,050	—	208,900
	2,867,660	1,121,400	3,803,790

The stock of oil seeds on hand at the end of the year 1892 was	35,000 metrical quintals.		
Received in 1893	3,803,790	"	"
	3,838,790	"	"
Deducting the stock in hand at the close of 1893,	40,000	"	"
	3,798,790	"	"
The mills at Marseilles crushed	3,260,000	"	"
	538,270	"	"
Being an excess over 1892 of			
These oil seeds produced	151,195,000 kilogrammes of oil.		
To which has to be added	12,698,000		
imported from various countries, which represents a total of	163,893,000	"	"

The average imports of oil at Marseilles, in each of the five years ending 1893, was 27,643,400 kilogrammes, and the average annual exports in the same period was 38,923,200 kilogrammes (of $2\frac{1}{5}$ pounds) per annum.

The progress of the trade in oil seeds and oil at the port of Marseilles has been enormous in the last twenty-five years, and has advanced from 184,986 tons of all kinds in 1870, to 380,279 tons in 1893, of 20 cwt.

The fixed or expressed oils imported into the United States were, in 1890, 20,323,677 pounds free, valued at \$1,437,216, and of other oils, dutiable, 687,797 gallons, value, \$417,388. In 1894, olive oil was imported to the extent of 21,173 gallons, value, \$23,262, and

other fixed oils, 45,470 gallons, value, \$28,308, dutiable. The volatile or essential oils imported in the States in the last ten years were :

	Pounds.	Dollars.
1885	4,594	10,184
1886	3,536	19,917
1887	2,220	6,546
1888	4,820	7,776
1889	53,374	10,375
1890	19,707	10,018
1891	74,972	12,765
1892	19,080	10,233
1893	80,320	16,931
1894	16,862	9,252

The exports from China were fixed oils (which include benne oil, ground-nut, tea seed and wood oils), as follows, in piculs of 133 $\frac{1}{3}$ pounds :

	Fixed Oils.		Volatile or Essential. (Aniseed, Cassia Leaf, etc.)	
	Piculs.	Value.	Piculs.	Value.
1889	43,390	£61,000	2,074 $\frac{1}{2}$	£51,943
1890	49,643	70,680	2,207 $\frac{1}{2}$	55,153
1891	44,589	62,109	2,174 $\frac{1}{2}$	62,300
1892	44,062	55,551	3,168	83,045
1893	152,069	200,557	2,273 $\frac{1}{2}$	57,623
1894	196,928	162,965	2,685 $\frac{1}{2}$	75,688

From British India the fixed oils exported are chiefly castor oil, 3,000,000 gallons yearly; cocoanut oil, 1,500,000 gallons; a small quantity of til, or gingilie (sesame), 250,000 gallons, and of other kinds of oil, about 300,000 gallons. The volatile or essential oils exported from India are now about 18,000 gallons, valued at £44,000.

The specific gravity of oils has been carefully determined, and is of some consequence. To be of value, the specific gravity should be carefully taken at a temperature of 60° Fahr. The oliometre should be marked with ordinary specific gravity degrees, water being 1,000, and the face allowed on the stem for each degree should not be less than one-tenth of an inch. As a rough rule, 1° of gravity may be substituted for every 2 $\frac{1}{2}$ per cent. excess of temperature above 60° Fahr.

MINERAL AND METAL PRODUCTION OF THE UNITED STATES IN 1893 AND 1894.

The following statistics of mineral products of the United States, which are of especial interest to pharmacists, are taken from a compilation by Richard P. Rothwell, and published in *The Engineering and Mining Journal*, June 1, 1895 :

Products.	Customary Measure.	1893.		1894.	
		Quantity.	Value at Place of Production.	Quantity.	Value at Place of Production.
Corundum and emery . . .	Short tons.	1,747	\$140,589	1,220	\$109,500
Tripoli and infusorial earth	"	1,351	25,625	1,802	36,687
Alum	"	96,000	2,880,000	72,000	2,160,000
Antimony ore	"	850	41,000	165	9,075
Asbestos	"	120	6,000	250	3,750
Fibrous talc	"	36,500	337,625	39,600	396,000
Talc and soapstone . . .	"	20,100	366,825	21,044	401,892
Barytes	"	26,632	133,160	23,758	95,032
Bauxite	Long tons.	19,041	55,205	10,732	42,928
Borax	Pounds.	9,199,000	689,925	13,140,589	919,841
Bromine	"	348,399	87,100	379,444	98,655
Cobalt oxide	"	3,894	5,452	6,550	8,843
Copperas	Short tons.	17,862	134,520	14,897	104,100
Copper sulphate	Pounds.	54,000,000	1,822,500	60,000,000	2,016,000
Chrome ore	Long tons.	1,629	16,000	2,653	35,125
Graphite	Pounds.	882,912	39,731	770,846	34,689
Gypsum	Short tons.	330,231	927,615	287,517	849,925
Lime	Barrels, 200 lbs.	60,000,000	30,000,000	56,750,000	28,375,000
Magnesite	Short tons.	1,143	8,000	1,370	4,864
Manganese ore	Long tons.	9,150	60,000	11,735	74,890
Paints, mineral	Short tons.	44,709	726,160	38,801	662,262
Paints, white lead	"	88,500	9,469,500	87,242	8,445,174
Paints, zinc oxide	"	25,000	1,875,000	22,814	1,711,275
Petroleum, crude	Barrels, 42 gals.	50,349,228	32,223,505	48,527,336	40,762,962
Phosphate, rock	Long tons.	981,340	3,434,090	952,155	2,856,465
Salt, evaporated	Barrels, 280 lbs.	9,793,419	4,945,583	9,161,053	4,608,275
Salt, rock	"	1,935,642	678,064	2,341,922	788,681
Soda, natural	Short tons.	2,500	12,500	—	—
Soda, natural sulphate . .	"	90	450	—	—
Aluminum	Pounds.	312,000	202,800	817,600	490,560
Antimony	Short tons.	350	63,000	220	39,200
Copper	Pounds.	327,255,788	35,179,997	353,504,314	33,540,489
Gold	Troy ounces.	1,739,323	35,955,000	1,923,619	39,761,205
Iron, pig	Long tons.	7,043,384	93,888,309	6,657,388	71,966,364
Lead, value at New York .	Short tons.	166,678	12,434,178	160,867	10,585,048
Nickel, fine	Pounds.	25,893	12,429	—	—
Quicksilver	Flasks, 75½ lbs.	30,164	1,108,527	30,440	1,095,840
Silver, commercial value .	Troy ounces.	60,500,000	47,311,000	49,846,875	31,403,531
Zinc, spelter	Short tons.	76,255	6,214,782	74,000	5,209,882

All of the mineral products of the country are not given in the above table, but only those which have some pharmaceutical interest. The total value of all the mineral products of this country amounted in 1893 to \$615,896,806, and in 1894 to \$553,272,902, showing a decrease in values last year of \$62,573,904, or 9 per cent.

The silver production of the United States was maintained at a much higher level than had generally been expected. In 1893 the production was 60,500,000 ounces, a decrease of 4,500,000 ounces from 1892, when it reached its highest level. The low price with which 1894 opened, and the withdrawal of the

artificial demand created by the Sherman law, led many persons to believe that the reduction would approximate the amount of the Government purchases under that law, or 54,000,000 ounces, which would have been equivalent to practically wiping out the industry. The actual decrease in 1894 was only 10,654,000 ounces, or about 18 per cent. The reduction still leaves the United States the greatest silver producer of the world, and the industry is, and will doubtless continue to be, a most important one.

THE HISTORY OF PARAFFINED PAPER IN AMERICA.

Paraffined paper is an American improvement on waxed paper, which was an English invention. This waxed paper was made by dipping sheets of paper into melted beeswax. Such a treatment rendered the paper impervious to moisture and grease, and in England the product found some application in pharmacy, and perhaps in other arts.

The first use made of waxed paper in America was by William Hodgson, who conducted a pharmacy at Tenth and Arch Streets, Philadelphia. This occurred in 1854. Mr. Hodgson had learned the usefulness of the article from John Bell, the well-known English pharmacist. Mr. Hodgson used the paper between spread plasters for the purpose of preventing their sticking together. Although paper so prepared had long been known to writers upon scientific subjects, it found but this limited application in pharmacy and probably less use in other arts until 1865. But about this time the true value of a commodity possessing its properties was commencing to be appreciated.

Until the year mentioned waxed paper was prepared only by those who found it applicable in their own enterprises. But the increasing consumption of the article suggested to the firm of Mellor & Rittenhouse, of Philadelphia, the idea of manufacturing it for sale. To Mr. H. N. Rittenhouse, who was at the time a member of that firm, but who is now an uninterested party, we are indebted for the data of this history. At this juncture we have an example of the ingenuity of American pharmacy. Paraffin was about this time beginning to claim some of the attention which it has since been found to merit. Suspecting in that substance the properties that contributed to the peculiar advantages possessed by waxed paper, this firm decided to substitute paraffin for the more costly beeswax with which to impregnate the paper. This they did, and, aside from the important feature of difference in cost, the greater beauty of

the paper saturated with paraffin was considered to be sufficient to favor the use of that substance. The first application of their product was to prevent the sticking together of plasters, and then to such uses as the wrapping of articles that required the exclusion of moisture, or that were to avoid contact with oily substances.

The experience of these parties proved the new product to be capable of replacing the old, and, for the last two purposes mentioned, paraffined paper is, at the present time, considered as almost indispensable. It rapidly replaced waxed paper, but retained its name, so that what is intended to-day, when waxed paper is called for, is almost invariably the product prepared with paraffin.

Shortly after its introduction its adaptability to the uses cited attracted the attention of confectioners, to whom the first sales were made. By them the paper was used for wrapping candies. The annual sales of the article at that time amounted to not more than \$150. In 1868, the originators of it exhibited samples of their manufacture at the annual meeting of the American Pharmaceutical Association, which was held in the Philadelphia College of Pharmacy. This exhibition not only served to direct attention to the article and to demonstrate its value as applied, but also suggested new uses for it.

The process of manufacture that was at first employed by the originators of the use of paraffin consisted of impregnating with that substance sheets of paper spread upon heated surfaces. This plan was followed until the greatly increased demand for the product rendered such methods inadequate. Accordingly, in 1877, these manufacturers invented a machine whereby the production could be more readily accomplished, and at the same time a company was organized for the purpose of developing what gave unmistakable evidence of becoming a business of itself.

As the product was never patented, nor its preparation held a secret, several firms quietly adopted the idea. They not only prepared it for their own use, but very probably also for sale, for, when at last the paper was recognized as a regular article of manufacture, competition was attracted to it from all sides. Various machines for its production were patented, and for ten or twelve years almost incessant litigation for alleged infringement followed as the consequence. After spending much money and experiencing many disappointments in the delays and decisions of the courts, the litigants

finally concluded to harmonize and form a trust or some agreement whereby peace should prevail. Thus, from being a product of only a few hundred dollars' worth at the outset, paraffined paper has become a staple article, at least \$400,000 worth now being annually consumed. In 1889 there were, in various parts of the United States, six concerns, with an invested capital of \$100,000 to \$200,000, engaged in the manufacture of paraffined paper.

MERCURIC CHLORIDE IN THE TREATMENT OF RHUS POISONING.

BY A. F. WITMER, M.D.

I would call attention to the value of corrosive sublimate in the treatment of dermatitis venenata. Permit me to cite a case.

D. L., aged 28 years, is very susceptible, direct contact with the plant not being necessary to induce a violent eruption. He has yearly attacks of a severe type, frequently lasting for six weeks. He applied for treatment in the early part of May with the typical eruption on the face and fingers. The patient was given one-thirty-second of a grain of mercuric chloride every three hours. Within four days the eruption had entirely disappeared. The topical application consisted of lead water and laudanum, during the acute stage; of hot water, frequently applied, during the stage of exudation, and of a two per cent. carbolated petrolatum ointment during the stage of desquamation.

This case is of interest owing to the rapid convalescence of the patient during a time when the toxic plant (*rhus*) is particularly virulent.—*Phila. Polyclinic*, June 29, 1895.

NEW YORK STATE PHARMACEUTICAL ASSOCIATION.

The first session of this Association was held at Saratoga, N. Y., Tuesday, June 25, 1895. The following papers were read:

"Fluid Extract of Wild Cherry," by G. V. Dillenbach; "Recent Additions to Our Materia Medica," by R. G. Eccles; "Modern Pharmacy," by Thomas J. Keenan. The last constituted the report of the Committee on Pharmacy and Queries.

The officers elected were: G. J. Seabury, President; L. A. Baker, D. L. Cameron and E. S. Smith, Vice-Presidents; Clay W. Holmes, Secretary; W. B. Fuller, Treasurer; W. L. Du Bois, P. W. Ray and Thomas Stoddard, Executive Committee.

NEW JERSEY PHARMACEUTICAL ASSOCIATION.

The twenty-fifth annual meeting of this Association was held at Newark, N. J., May 22 and 23, 1895.

The most noteworthy communication was on "The Pharmacology of Saw-Palmetto," by H. H. Rusby, W. H. Bastedo and Virgil Coblenz.

EDITORIAL.

THE UNIVERSAL TRADE ASSOCIATION AND THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The "Universal Trade Association" is a corporation located at Detroit, whose avowed object is to unite all the retail druggists of the United States and Canada into one stock company, with a capital of \$1,000,000.

When organization has been completed, by securing thirty thousand of the forty thousand druggists of America, the business of the corporation will be to correct the abuses which exist in the retail drug business, notably the "cutting of prices" in patent medicines.

Of the merits or demerits of this proposed "plan," we are not disposed to speak, but any corporation or "trust" that is proposing to raise \$1,000,000 from the retail druggists of America should carry itself so far above the suspicion of sharp practice as to absolutely prevent the slightest reflection on its character.

The following communication will show, however, that the conduct of the aforesaid corporation towards the Pennsylvania Pharmaceutical Association has not been such as to win for it the confidence of the members of the latter body:

Editor AMERICAN JOURNAL OF PHARMACY.

SIR:—I notice in the *June* issue of *The Retail Druggist*, the organ of the "Universal Trade Association," a corporation having its headquarters in Detroit, that the Pennsylvania Pharmaceutical Association, at its last meeting in Eagle's Mere, in June last, gave an unqualified indorsement of the "Universal Trade Association" by the adoption of the following resolution:

"Having heard the details of the objects of the Universal Trade Association for the protection of the trade interests of the retail druggists of the United States and Canada, that we hereby express our approval of the same and strongly recommend the retail druggists of the State to join the Association with a view of promoting its universal adoption by manufacturers, wholesalers and retailers."

The publication of this resolution, after the action taken by the Pennsylvania Association, puts the Universal Trade Association, to say the least, in a very unfavorable position before the drug trade of the country, and will damage them in the estimation of all right-thinking persons. It is true this resolution was passed at one of the sessions, and only because, without the knowledge of the meeting, its author had induced Dr. Charles A. Heinitsh, an old and honored member, to present it. In such esteem is Dr. Heinitsh held, that it was not seriously opposed. After the action was taken, it was felt by many that there had been too much haste; that nothing was known of the "Universal Trade Association" other than the representations made by its agent, and that to give the unqualified indorsement of the Pennsylvania Pharmaceutical Association to a plan of which the members knew absolutely nothing, was a great mistake. Hence, at the very next session, less than three hours afterwards, the action was reconsidered with but one or two dissenting votes and the "Universal Trade Association" plan was thoroughly discussed. The agent, who was a member of the Association, was entitled to all the privileges of the floor.

He tried to answer the arguments which were presented against the adoption of the resolution and to prevent any unfavorable action being taken, for which he is to be commended, but failed. Instead of indorsing the "Universal Trade Association," the following action, altogether very different in character, was taken:

"We heartily approve of the organization of an exclusive retail drug association, or any plan or plans which may be indorsed by the American Pharmaceutical Association, or a majority of the State pharmaceutical associations, looking to the amelioration of the condition of the drug trade."

After the adoption of this resolution, the agent of the "U. T. A." moved to have all previous action and the discussion relative thereto expunged from the proceedings, to which the Association would not agree.

In view of this falsification of the records of the Pennsylvania Association, what explanation will the "Universal Trade Association" make to the retail druggists of the country? How can it sustain itself before the thinking public? Let it answer.

J. H. REDSECKER.

LEBANON, PA., July 13, 1895.

It will not clear the "U. T. A." to say that the second resolution, as passed by the Pennsylvania Pharmaceutical Association, was also published in *The Retail Druggist*. Nor can it plead lack of time, for if there was time to print the second resolution there was also time to leave the first one out.

We presume this corporation will have agents at the Denver meeting of the American Pharmaceutical Association, and it will not be in accordance with its past policy if these agents do not have some well-known member to present a "cut and dried" resolution of indorsement.

There have been many well-matured "plans" presented to the suffering pharmacists of America during the past few years, but all of them have failed. This last one has the assurance to ask for an amount of money that is equivalent to an average of \$25 from every druggist of the country, then it will begin business and commence to declare dividends. One of the first arguments of an agent is: "You have been crying for deliverance, and now when you have the opportunity offered, you are too pessimistic to take advantage of it."

THE PHARMACEUTICAL JOURNAL.

The first number of Volume I, fourth series, of this time-honored and successful publication has reached us. It has attained the fifty-fifth year of its existence, with its energy in no way impaired.

Under the title of "Pharmaceutical Transactions," it was originally published by Jacob Bell, to record the transactions of scientific meetings held by Bell and other members of the Pharmaceutical Society.

On turning back in the AMERICAN JOURNAL OF PHARMACY to 1841, page 301, we find the new Journal welcomed in the following words:

"Not the least gratifying evidence of the spirit with which the active members of the Association¹ have entered into the cause is the establishment of the monthly scientific journal, before referred to, bearing the title of 'Pharmaceutical Transactions,' of which we have the first four numbers before us.

"It is edited by Jacob Bell, an active and able member of the Council, and published for the present by him, on his own responsibility, as an experiment; although it is, no doubt, to

¹ The Pharmaceutical Society of Great Britain.

be considered as the organ of the society, and will be officially adopted as such, when the institution becomes fully organized. It contains the proceedings of the society, the papers read at the scientific meetings, pharmaceutical and general scientific intelligence, etc.

"We observe in it extracts from our own journal, and in return present in the present number selections from it, and, as its only collaborateur in the same language, we heartily bid it welcome."

The first series of the Journal extended over eighteen years. In 1859, on the death of Bell, Redwood, who had assisted him, continued as editor in conjunction with Bently and Barnard, thus forming the second series, extending over eleven years. Then, shortly after the passing of the Pharmacy Act, in 1868, the issue of a weekly publication, as a third series of the Journal, was decided upon to meet the increased demand for information, more or less directly interesting in connection with pharmacy.

One year after founding the Journal, Bell gave it the title of "Pharmaceutical Journal and Transactions." With the beginning of the present series the title has very appropriately become "The Pharmaceutical Journal." The first number of the new series appeared on July 6th, with an enlarged page and with some seventy-eight pages of advertisements and a supplement of trade notes of eight pages. The whole is a magnificent exhibition of the enterprise of the editor and of the condition of the pharmaceutical profession in Great Britain and the Colonies that will absorb 7,000 copies of such a publication weekly.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

DIE GERICHTLICH-CHEMISCHE ERMITTELUNG VON GIFTEN IN NAHRUNGSMITTELN, LUFTGEMISCHEN, SPEISERESTEN, KÖRPERTHEILEN, ETC. Von Georg Dragendorff. Fourth edition. Göttingen, Vandenhoeck and Ruprecht. 1895. Pp. 532.

There is probably no better work in any language on the chemistry of poisons than this one, which has now reached its fourth edition.

The author presents the subject in a clear and logical manner. The introduction gives general rules for the investigation for poisons, and treats of such subjects as exhuming, taking of samples and the presence of antiseptics and embalming fluids. In the special part, the various poisons are considered in a systematic manner, beginning with the *halogens* and *strong acids*, and then treating of *poisonous gases*, *volatile poisons*, as phosphorus, chloroform, alcohol, ether, benzol, ethereal oils, etc., *alkaloids*, *glucosides*, *non-alkaloidal substances*, as cantharidin and digitalin, the *heavy metals*, and, finally, the alkalies and alkaline earths.

While the non-metallic portion is exhaustively treated, it is in the consideration of the vegetable poisons that Professor Dragendorff especially excels. He knows whereof he writes, because of his practical study of the subject, and not by quoting some other writer, although his citation of references is very complete.

A full index and a table of blood spectra complete this valuable work.

FORMULAIRE DES SPÉCIALTÉS PHARMACEUTIQUES. Par M. Gautier et F. Renault. Paris. J. B. Baillière et Fils. 1895. Pp. 298.

This book belongs to a series of useful volumes, issued by the same publishers during the past few years. Unlike its predecessors, however, this one appears to have little in it of value to the pharmacist. It purports to give the composition, therapeutic indications, mode of administration and dose of a number of pharmaceutical specialties that have but little excuse for their existence, except that they have been so persistently brought to the attention of physicians, and their presumed superiority over official preparations so conspicuously set forth that the medical practitioner has been induced to prescribe them.

We are told, in the opening paragraph of the preface, that "pharmaceutical specialties are being more and more prescribed by physicians; the practitioner desires a remedy that is sure, easy to order without complicated formula, of constant composition, and not exposed to the difficulties or errors of the official preparations." In other words, the official preparations are slurred, and the physician is told in plain English (or rather French), that since he is too intolerably lazy and ignorant to do more than write his own name, all the rest is done for him.

The composition of the remedies is given in a vague sort of a way, that precludes anyone from knowing what is contained in them, and the whole savors strongly of some American price-lists, containing about as much information, except that no price is given. There is one exception to the usual beclouded statement of composition, and that is *dermatol*, for which a working formula is given.

TABULAR REVIEW OF ORGANOGRAPHY. Prepared for the use of the classes in botany of the Department of Pharmacy, University of Buffalo. By A. L. Benedict.

This pamphlet, of twenty pages, has been prepared for use in connection with Bastin's College Botany. It is intended to be used by the student in his field work; and alongside of the numerous headings, blank space is left to be filled in by the student.

ÉTUDES DES PLANTES DES COLONIES FRANÇAISES. Par Henri Bocquillon-Limousin. Paris. A. Hennuyer, 1895. Pp. 94.

The author has previously communicated information on this subject, and the present pamphlet is devoted to the colonial plants having febrifuge properties. Each plant is considered in the following systematic order: *Synonym, habitat, part employed, botanical characters, anatomy, chemical composition, therapeutic properties and dose*. Under chemical composition the results of the author's own investigations are usually given. The whole is an interesting and valuable contribution to economic botany.

VIERTELJAHRESSCHRIFT ÜBER DIE FORTSCHRITTE AUF DEM GEBIETE CHEMIE DER NAHRUNGS-UND GENUSSMITTEL. Zehnter Jahrgang. Erstes Heft. Berlin, 1895. Verlag von Julius Springer.

TRANSACTIONS OF THE ACADEMY OF SCIENCE OF ST. LOUIS.—Vol. VI, No. 18.—*Proceedings and Index*.

Vol. VII, No. 1. *A Study of the Unionidæ of Arkansas, with Incidental Reference to their Distribution in the Mississippi Valley*. By R. Ellsworth Call.

Vol. VII, No. 2. *On the Electrical Capacity of Bodies, and the Energy of an Electrical Discharge*. By Francis E. Nipher.

Vol. VII, No. 3. *Note on the Glacial Drift in St. Louis. Note on the Occurrence of Blende in Lignite. Recent Additions to the Mineralogy of Missouri.*

NOTIZEN ÜBER HYDRIRTES CINCHONIN, HYDROCHLORCINCHONIN UND HYDROCHLORAPOCINCHONIN. NOTIZEN ÜBER EINIGE CHINAALKALOIDE. Von O. Hesse. Reprints from *Berichte der Deutschen Chemischen Gesellschaft*. Berlin, 1895.

CATALOGUES.

TENTH ANNUAL ANNOUNCEMENT OF THE BUFFALO COLLEGE OF PHARMACY. Buffalo, N. Y.

TWENTY-FOURTH ANNUAL CIRCULAR OF THE NATIONAL COLLEGE OF PHARMACY. Washington, D. C.

UNIVERSITY OF TENNESSEE, MEDICAL DEPARTMENT, Nashville, Tenn. Announcement, 1895-96.

ANNUAL ANNOUNCEMENT OF THE NEW JERSEY COLLEGE OF PHARMACY. Session of 1895-96. Newark, N. J.

MASSACHUSETTS COLLEGE OF PHARMACY. Twenty-ninth Annual Catalogue, 1895-96. Boston, Mass.

PROSPECTUS OF THE COLLEGE OF PHARMACY OF THE CITY OF NEW YORK, 1895-96.

SALE-CATALOGUE OF THE LIBRARY OF THE LATE PROFESSOR JOHN M. MAISCH. Address Mrs. C. J. Maisch, 753 North Fortieth Street, Philadelphia, Pa.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The forty-third annual meeting will convene at Denver, Col., commencing on Wednesday, August 14, 1895, at 3.30 P.M.

Hotel Accommodations.—Headquarters of the Association will be at the Brown Palace Hotel. Rates reduced from \$6 to \$3 for members of the American Pharmaceutical Association and their friends. The "Windsor" and the "Albany," both also first-class hotels, have reduced their rates to \$2 per day. For quarters, address Mr. E. L. Scholtz, Local Secretary, American Pharmaceutical Association, Denver, Col.

Proposals for membership should be sent to the Secretary of the Committee, Geo. W. Kennedy, Pottsville, Pa., not later than August 7th, or after that date may be addressed to him at Denver, Col., care of the Brown Palace Hotel. For further information address the Chairman of the Committee on Membership, Dr. H. M. Whelpley, 2342 Albion Place, St. Louis, Mo.

Reports and essays intended for use at the coming meeting should be sent at once to the chairmen of the respective sections, viz: Scientific Papers, Dr. A. R. L. Dohme, Baltimore, Md.; Education and Legislation, Prof. James M. Good, St. Louis, Mo.; Commercial Interests, Mr. Geo. J. Seabury, New York, N. Y.

Credentials of delegates should reach the Permanent Secretary at least two weeks in advance of the meeting, as provided by Chapter VIII, Article 5, of the By-laws. Those sent later should be addressed in care of the Local Secretary, Mr. Edm. L. Scholtz, Denver, Col.

A session of the Council will be held at the Brown Palace Hotel, on Wednesday, August 14th, at 9.30 A.M., for the purpose of arranging the business of the Association in compliance with Chapter VI, Article 6, of the By-laws.

TRAVELLING ARRANGEMENTS.

Particular attention is directed to the following information furnished by the Committee on Transportation.

Rates.—The Western, Southern and Central Passenger Associations have made a rate of one fare for the round trip from all points in their territories, covering the entire section lying west of a line drawn through Toronto, Canada, Buffalo, N. Y., Parkersburg and Charlestown, W. Va. East of this line is the territory of the Trunk Lines Association; on June 11th they refused to consider our application for a rate. On June 25th they made us a rate of one and one-third fares for the round trip. Following the favorable action of all the other passenger associations, this seems an extraordinary procedure, and there is reason to think that in a few days it will be favorably reconsidered. We shall then have half rates from practically every point in the United States and Canada east of the Rocky Mountains. It is with regret the committee announce their utter failure to get any concessions for members on the Pacific Coast.

The Missouri Pacific Railroad has announced an extension until September 1st, on the return portion of tickets over their line. Other lines will doubtless follow with similar announcements, and thus all visitors be enabled to enjoy the benefits of such extension.

ROUTES.

While members are at liberty to select whatever route they may choose, the following have been recommended by the committee:

FROM THE EAST.

Leave Boston via Fall River Line, or by any preferred route, so as to make connection with the party which will leave New York as follows:

Leave New York	via B. & O.,	Friday, August 9th,	6 P.M.
" Philadelphia . . .	" " " "	" "	8.23 P.M.
" Baltimore	" " " "	" "	10.50 P.M.
" Washington	" " " "	Saturday, " 10th,	12.01 A.M.
Arrive Cincinnati . . .	" " " "	" "	5.30 P.M.
Leave "	" " " "	" "	8.15 P.M.
" Vincennes	" " " "	Sunday, " 11th,	2.38 A.M.
Arrive St. Louis	" " " "	" "	7.12 A.M.
Leave St. Louis	via Mo. Pac.,	Monday, " 12th,	9.00 A.M.
" Jefferson City . . .	" " " "	" "	1.05 P.M.
" Sedalia	" " " "	" "	3.00 P.M.
Arrive Kansas City . . .	" " " "	" "	6.00 P.M.
Leave "	via Union Pac.,	" " "	11.00 P.M.
Arrive Denver	" " " "	Tuesday, " 13th,	5.00 P.M.

The lay-over of twenty-six hours in St. Louis has been arranged for so as to enable the party to see something of that city. At Kansas City an informal reception is to be tendered the visitors by the local pharmacists.

FROM CHICAGO.

Leave Chicago	via Santa Fé R. R.,	Sunday, August 11th,	5.00 P.M.
" Kansas City	" "	Monday, " 12th,	9.00 A.M.
" Colorado Springs . .	" "	Tuesday, " 13th,	8.30 A.M.
Arrive Denver	" "	" " 13th,	11.00 A.M.

A stop-over of one day at Colorado Springs, including a trip to Manitou and other resorts, is contemplated by those taking this route, resuming the journey to Denver the day following, arriving in ample time for the first session of the Association.

R. J. Brown, of Leavenworth; George Leis, of Lawrence, and C. E. Corcoran, of Kansas City, are a committee appointed by the chairman to look after the comforts of those who travel this route.

Sleeping Cars.—One berth will accommodate two persons, though more comfortable for one:

New York	to Denver	price per berth, \$11 00
Baltimore	"	" " 11 00
Washington	"	" " 11 00
Cincinnati	"	" " 8 00
St. Louis	"	" " 5 50
Chicago	"	" " 6 00
Kansas City	"	" " 3 50

Mr. C. A. Mayo, 37 College Place, New York City, will receive applications for berths to St. Louis from parties leaving New York and other Eastern points on August 9th.

Mr. W. J. M. Gordon, 710 Plum Street, Cincinnati, and Mr. N. R. Warwick, 131 Vine Street, Cincinnati, Agent of the Missouri Pacific Railway, will do similar service for those desiring reservations at Cincinnati.

Special arrangements for Pullmans will be made at St. Louis by the Missouri Pacific, and at Chicago by the Santa Fé Railroad. Those wishing sleeping car reservations at St. Louis should address H. C. Townsend, General Passenger Agent, Missouri Pacific Railway, or Dr. H. M. Whelpley, 2342 Albion Place.

Those wishing them at Chicago should address Geo. T. Nicholson, General Passenger Agent, Atchison, Topeka and Santa Fe Railroad, or Mr. A. E. Ebert, 426 State Street.

At Kansas City, Mr. J. B. Frawley, Agent Union Pacific System, and Mr. Geo. W. Hagenbuch, Agent Santa Fé, will cheerfully attend to any commissions intrusted to them.

How to Return.—A choice of any direct route from Denver will be permitted returning; choice to be designated at time and place of purchasing ticket.

Members from the east of Parkersburg may return via the Denver and Rio Grande to Pueblo, and thence via the Missouri Pacific to St. Louis or via Kansas City and Chicago.

Members from Chicago who go out over the Santa Fé are recommended to return via Union Pacific to Kansas City and thence to Chicago on the Santa Fé.

While the above are recommended there are other excellent routes which the members are at liberty to select.

TICKETS.

Selling Days.—At Chicago and St. Louis and Western points, August 11th and 12th; at all points farther East tickets will be sold August 9th, 10th and 11th, but not to reach Chicago or St. Louis prior to August 11th or later than August 12th.

How to Purchase Tickets.—Members outside the territory of the Trunk Line Association (see paragraph on rates) can purchase at any regular ticket office a *round trip ticket* to Denver for one first-class fare. The return route must be designated at the time of the purchase of these tickets. Where the tickets themselves are not on sale, a partial ticket will be issued with an exchange order for the remainder of the ticket, which is to be presented at a specified ticket office. Tickets are good going only on date of sale as stamped on the back and for continuous passage to Colorado. After reaching Colorado stop-overs will be allowed 'either going or returning' at Pueblo, Colorado Springs and Denver. Members convenient to the Baltimore and Ohio can purchase tickets through the nearest member of the Committee. Those residing in the Trunk Line Association territory, and not convenient to the B. & O., may either purchase tickets on the "association plan," paying one and one-third fares for the entire round trip, or may purchase round trip tickets at the regular rate to the nearest point in the territory of the Central Traffic Association (see paragraph on rates), and at this point purchase a round trip ticket for one fare.

Any further information may be obtained from the members of the Transportation Committee.

CHARLES M. FORD, *Chairman*,
700 Fifteenth Street, Denver, Col.

CASWELL A. MAYO,
37 College Place, New York.

S. A. D. SHEPPARD,
1129 Washington Street, Boston, Mass.

W. J. M. GORDON,
710 Plum Street, Cincinnati, O.

H. M. WHELPLEY,
2342 Albion Place, St. Louis, Mo.

HARRY SHARP,
Marietta and Walton Streets, Atlanta, Ga.

A. E. EBERT,
426 State Street, Chicago.

L. F. CHALIN,
Carrolton and St. Charles Avenues, New Orleans, La.

WM. M. SEARBY,
400 Sutter Street, San Francisco, Cal.

CHAS. CASPARI, JR., *Permanent Secretary*,
109 Aisquith Street, Baltimore.

July 17, 1895.

OBITUARY.

SILAS MAINEVILLE BURROUGHS, PH.G.

Silas Maineville Burroughs, Ph.G., Class of 1877, was born in Medina, N. Y., in 1850, and died at Monte Carlo on Wednesday, February 6, 1895, of pneumonia, aged 45 years.

He received his early education in his native State, after which he entered the employ of Mr. E. T. Coann, at Albion, N. Y., as an apprentice to the drug business, remaining two years, and afterwards held positions in the drug stores of T. J. Chadwick, Lockport, N. Y., and S. H. T. Champlen, of Buffalo, N. Y. He came to Philadelphia and attended the Philadelphia College of Pharmacy, with Dr. E. P. Healy as his preceptor, and passed the examinations in March, 1877, number 22 in his class. His thesis was entitled, "Compression of Medicinal Powders." After his graduation he represented the firm of John Wyeth & Bros. for many years, and left the firm to establish himself in business in London, England.

His business career, as is well known, was characterized by untiring energy, and with a determination to succeed, no matter what obstacle might seemingly arise to interpose.

A few years ago he associated himself with Henry S. Wellcome, Ph.G., Class of 1874, under the firm name of Burroughs, Wellcome & Co., of which he was the senior member. With the aid of Mr. Wellcome, he established a very large and lucrative business, not only in Great Britain, Europe and America, but in all the British colonies of Asia, Australia and Africa.

He was well known throughout the pharmaceutical globe, having made two trips around the world, visiting all the prominent centres of pharmacy in each country.

He was a man of very liberal ideas and broad-minded views upon political matters, particularly the "Single Tax." Notwithstanding many differed from him in his extreme views, he was respected and honored for his straightforward manliness and courage, and for the honesty of his convictions.

His friendship was greatly appreciated by those who knew him best, for he was a man of generous heart, and had a sympathizing nature. Our Alumni Association has lost one of its most able and progressive members, one with whom it was an honor to be associated, as was attested at the annual meeting of the Alumni Association, held on Monday afternoon, April 15, 1895, when Prof. Joseph P. Remington, after making a few feeling remarks in reference to the great loss our Association and the pharmaceutical cause had sustained, offered the following resolutions, which were unanimously adopted, viz.:

"WHEREAS, The Alumni Association of the Philadelphia College of Pharmacy have heard with feelings of profound sorrow of the death of Silas Maineville Burroughs, Ph.G., of London, Eng.; be it therefore

"*Resolved*, That in the death of our fellow-member, while bowing in submission to the Divine will, we deeply deplore the loss of one who labored so assiduously for the benefit of his fellow-man, and although his voice will never more be raised in our midst, his example will ever be cherished as full of encouragement and help for every member of this Association.

"*Resolved*, That we tender our heartfelt sympathy to the family of our deceased member, and also to his business partner and fellow-alumnus, Henry

S. Wellcome, Ph.G., and that a copy of these resolutions be forwarded to them."

W. E. K.

FREDERICK BROWN, PH.G.

Frederick Brown, Ph.G., Class 1861, was born in Philadelphia, December —, in 1837, died suddenly at his summer residence, which was built by his father, in 1848, in Burlington, N. J., on Tuesday morning, September 25, 1894, of pneumonia, in his fifty-seventh year.

He was the eldest son of Frederick and Charlotte Augusta Hoppin Brown. His father was born in 1796, and was the original manufacturer of Brown's Jamaica Ginger, and founded the business in 1822, at the northeast corner of Fifth and Chestnut Streets (the old stand which was universally known as the "War Office," because of the building being used by the war department during the Presidency of Washington and Adams).

Frederick Brown, Jr., received his education first at the Episcopal Academy and afterwards at the University of Pennsylvania. After his early education was finished he entered his father's store and learned the drug business, and attended the Philadelphia College of Pharmacy, graduating with the Class of 1861, and after graduation he continued in his father's store for a short time; but being desirous of conducting a store of his own, he shortly afterwards rented a store on the southeast corner of Ninth and Chestnut Streets, under the Continental Hotel, and opened up business for himself. He remained here about two years, or until 1864, when he gave it up and re-entered the store of his father, who died a month later, when he inherited the business. He made many improvements in the store, and continued the business until 1889, when he removed the store to 127 South Fourth Street, and in 1890, desiring to devote his entire time to the manufacture of the essence of Jamaica Ginger, he sold the store to Charles G. Dodson, Ph.G., Class of 1859, who had been associated with him in the management of the drug portion of the business since the death of his father. Mr. Brown was then free to devote himself to the manufacture of his preparation, which he had been doing for some time previous, and with which his name had been identified.

In June, 1865, he married Miss J. E. Wills, of New Haven, Conn., who survives him, with three sons and a daughter.

Mr. Brown was not a society man, but preferring to spend his unoccupied time from business with his family in the house.

He was connected with St. Andrew's Protestant Episcopal Church, Eighth Street above Spruce, and was one of the vestrymen at the time of his decease. He was also President of the Laurel Hill Cemetery Company, of which his father was one of the founders.

His funeral services were held on Friday afternoon, September 28th, at St. Andrew's Protestant Episcopal Church, and was largely attended by his many friends.

He was a member of the Alumni Association of the Philadelphia College of Pharmacy.

W. E. K.

THE AMERICAN JOURNAL OF PHARMACY

SEPTEMBER, 1895.

STRUCTURE OF OUR CHERRY BARKS.

BY EDSON S. BASTIN.

Presented to the American Pharmaceutical Association, Denver Meeting, 1895.

The knowledge that the barks of two or more of our native species of cherry were occasionally, at least, substituted for the official species has led to the studies set forth in this paper.

The species of cherry growing wild within the limits of the United States are the following: *Prunus Pennsylvanica*, Linné filius; *Prunus Virginiana*, Linné; *Prunus serotina*, Ehrhart; *Prunus demissa*, Walpers; *Prunus Avium*, Linné; *Prunus Cerasus*, Linné; *Prunus Mahaleb*, Linné; *Prunus Caroliniana*, Aiton; *Prunus sphærocarpa*, Swartz; *Prunus emarginata*, Walpers, var. *mollis*, Brewer; and *Prunus ilicifolia*, Walpers.

This list excludes the closely related plums and those species of cherry which do not attain dimensions greater than those of a small shrub.

Of the species listed the barks of the following have been studied and are here described and figured: *P. serotina*, *P. Avium*, *P. Mahaleb*, *P. Virginiana* and *P. Pennsylvanica*. Efforts were made to procure the barks of *P. Caroliniana*, and of the Pacific Coast species, *P. demissa*, *P. emarginata*, and *P. ilicifolia*, but so far without success.

Prunus serotina, commonly called the Black cherry, is a tree of large size, common in the forest regions of the United States, from Minnesota, eastern Nebraska, and Louisiana, eastward to the Atlantic. It also occurs in southern Canada and Nova Scotia. It does not occur in the Rocky Mountains or west of them, except as

cultivated in San Francisco and vicinity, and perhaps in the vicinity of some other cities of the Pacific Coast. It seems to attain its fullest development in the valley of the Ohio, where it sometimes attains the height of 100 feet and its trunk a diameter of 4 feet. Ordinarily, however, it is smaller, with a trunk 18 inches in diameter and a height of 50 or 60 feet. Its close-grained heartwood

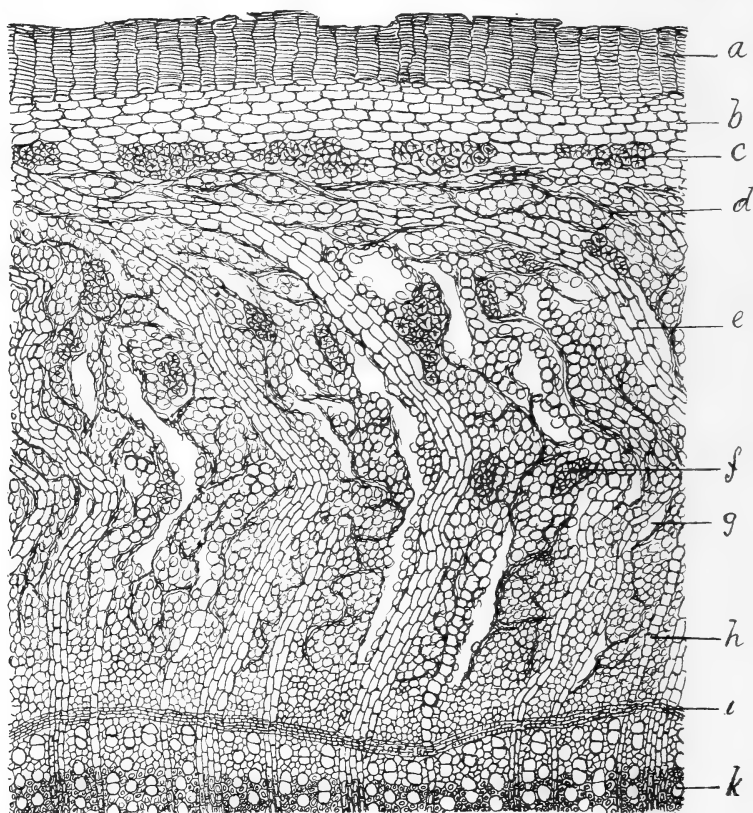


FIG. 1.—Transverse section of the stem bark of *Prunus serotina*.

which is capable of taking a high polish, and which has a light red color, deepening with age, is highly valued for cabinet and ornamental work. The bark of the trunk is blackish-brown and rough exteriorly, the exterior corky layers exfoliating transversely in thickish but rather narrow pieces. The bark of the twigs, however, is smooth or even glossy, dark reddish-brown, thickly punctate with

small whitish lenticels, and the corky layer may be readily peeled off transversely in a thin, papery layer, exposing the deep green middle bark beneath. The corky layer of the root, which is somewhat lighter colored, begins to fissure and exfoliate much earlier, and when the cork is removed it exposes a middle layer which is at first white, but, on exposure, soon turns ochreous

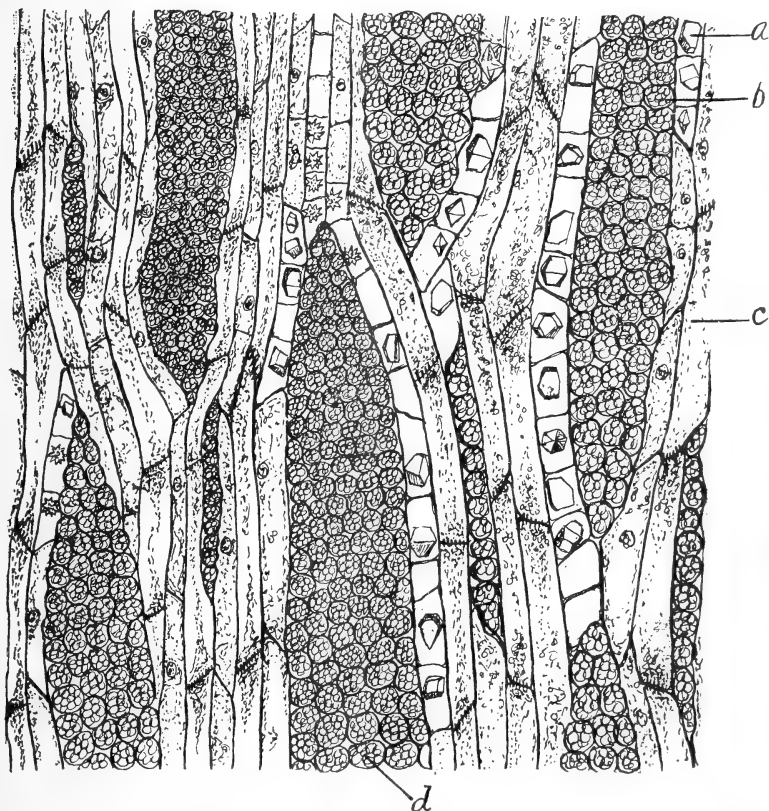


FIG. 2.—Longitudinal tangential section of inner bark of *Prunus serotina*.

brown. The leaves are short-petiolate, with thin, lanceolate, toothed, deciduous stipules, and elliptical, oblong, or oblong-lanceolate, taper-pointed, appressed-serrulate leaves, which are usually obtuse, but sometimes acute at the base, and commonly have a pair of glands on the petiole near the insertion of the blade. They are smooth on both surfaces, thickish, and deep and some-

what glossy green on the upper, and much lighter green on the lower surface.

The flowers occur in late spring, after the leaves, in simple racemes at the ends of small leafy branches. They are small, white and with a decided but not very agreeable odor. The drupes are small, round, about the size of peas, blackish-purple, destitute of a

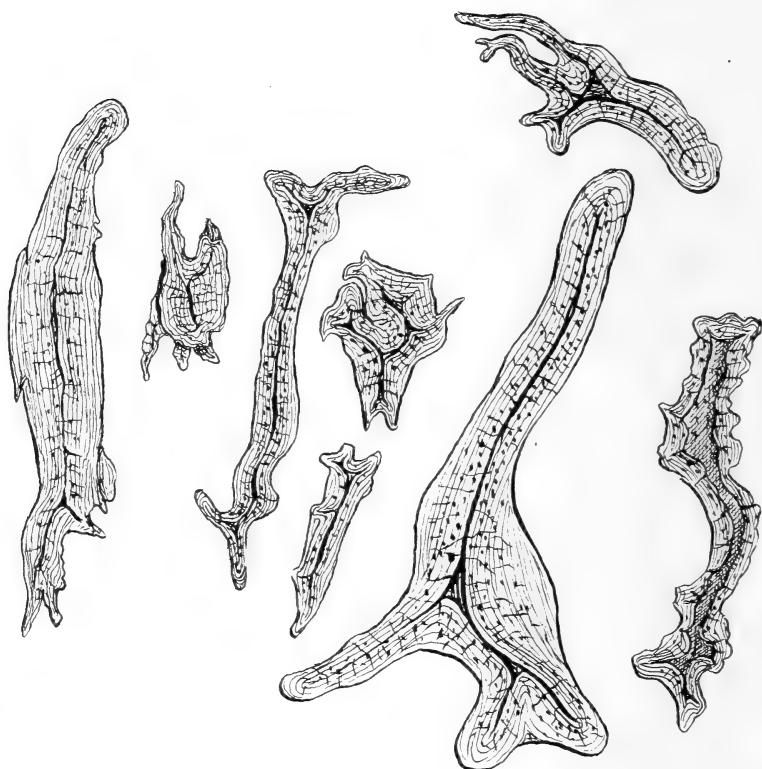


FIG. 3.—Sclerenchyma from bark of *Prunus serotina*.

bloom, bitterish, but not decidedly astringent to the taste, and containing a roundish-ovate, marginless pit.

Structurally the barks of the different species of cherries examined resemble one another in the following particulars:

(1) The phellogen begins its formation in the first layer of colenchyma cells beneath the epidermis, and no considerable development of the phelloderm layer beneath takes place.

(2) They all resemble one another in the facility with which the periderm layers are separated transversely into thin sheets.

(3) The medullary rays in all the species are several rows of cells thick, though the number of cells differs somewhat in different species.

(4) In all the barks examined the medullary rays are more or less wavy in their course, though less so in some species than in others.

(5) All the barks show a strong tendency to fissure between the medullary rays and adjacent bast tissues.

(6) All of the barks, especially of the trunk and older branches, are rich in oxalate of calcium crystals, some of them containing it in such quantities as to make sectioning difficult.

(7) All of the barks possess a bitter, astringent and more or less aromatic taste, but the bitterness is much less marked in some than

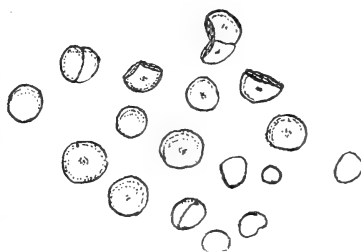


FIG. 4.—Starch from stem bark of *Prunus serotina*.

in others, and the aromatic quality is very decided in some, but barely perceptible in others.

The most prominent structural differences are in the number, arrangement and character of the sclerenchymatous elements. These and other differences will be noticed in the descriptions of the barks of the different species.

Bark of the Stem of Prunus serotina.—The periderm or corky layer separates readily in transverse bands from the rather thin layer or cortex beneath. The latter contains numerous clusters of short sclerenchymatous cells or stone cells, which form an interrupted zone in this layer of bark. Just underneath this layer the medullary rays, whose course from the cambium zone outward is more or less wavy, terminate very obliquely. The rays in their thickest part are from four to six cells broad, and between them lie the bast masses which, except near the cambium zone, consist of crumpled sieve

elements, sprinkled with masses of sclerenchyma. These masses are made up chiefly of stone cells, but sometimes contain more elongated elements, which, perhaps, might be regarded as bast fibres. They are, however, much shorter than bast fibres usually are, and

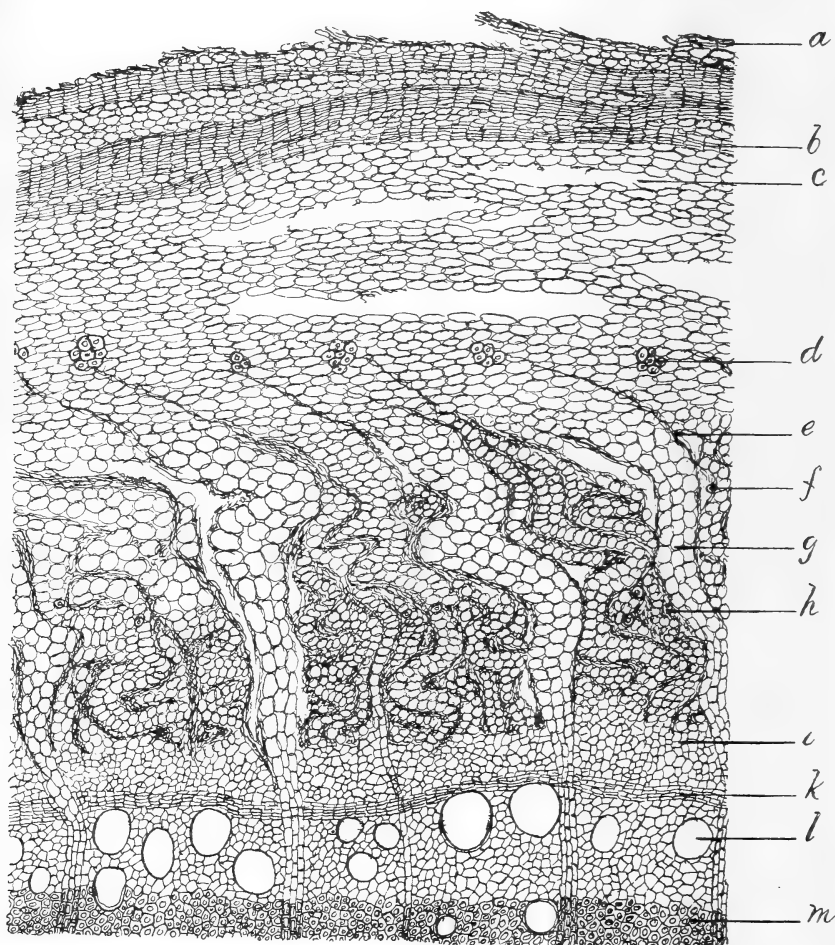


FIG. 5.—Cross section of stem bark of *Prunus Mahaleb*.

every gradation between them and stone cells may be observed. The fissuring along the bast masses is conspicuous in the cross-section. In the older bark, crystals of calcium oxalate are so abundant as to seriously interfere with sectioning. These crystals are

sometimes stellately clustered, but more commonly are single and are most abundant in the cells adjacent to the medullary rays.

The medullary rays contain usually an abundance of very fine-grained starch. The granules of starch are usually spheroidal and simple, with an inconspicuous central or sub-central hilum, and no

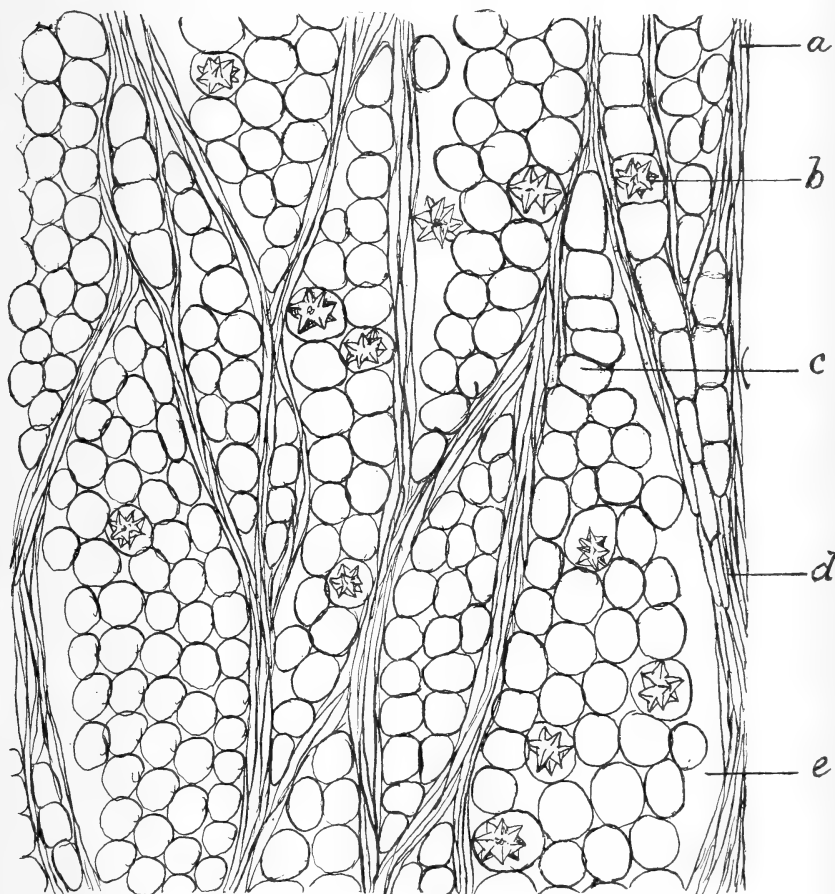


FIG. 6.—Longitudinal section of inner bark of *Prunus Mahaleb*.

other recognizable markings. Some double and treble grains, however, are observable.

The root bark of this species bears a close resemblance to that of the stem, but it is lighter exteriorly and the corky layer earlier begins to fissure. The clusters of sclerenchyma cells are less

numerous, and the bast fibres somewhat better differentiated. They are still few in number, however, as compared with the stone cells,

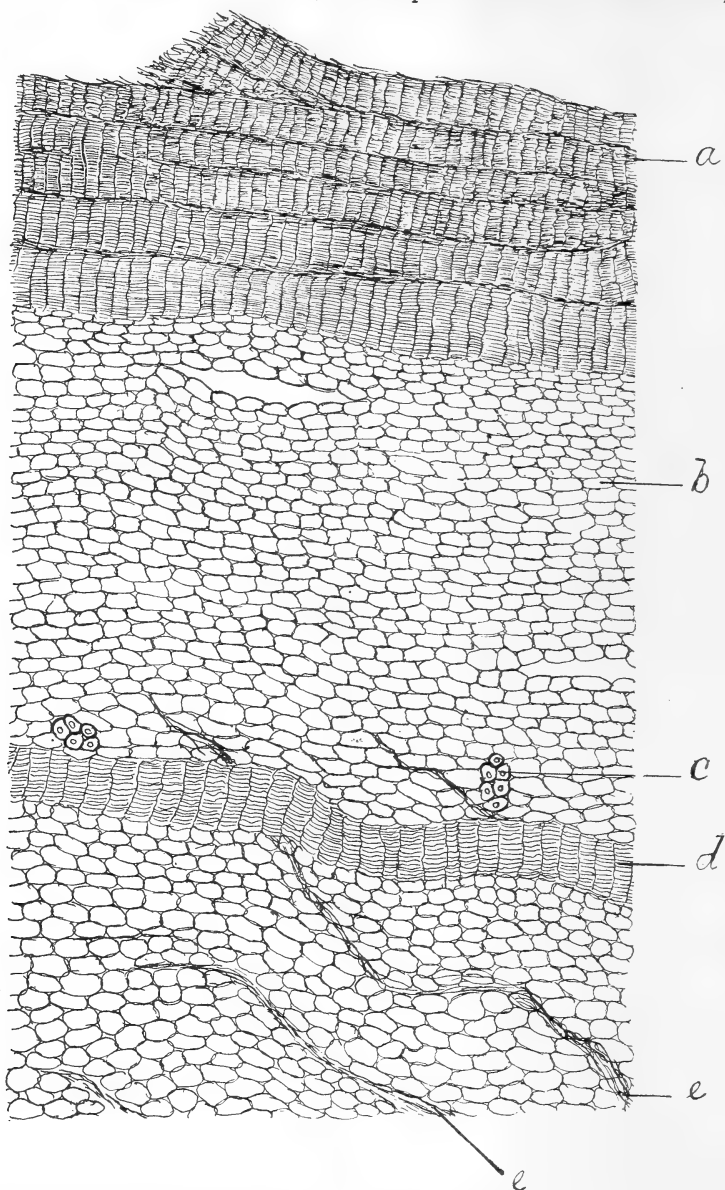


FIG. 7.—Cross section of bark of *Prunus Mahaleb*, including outer, middle and outer portion of inner bark.

and they occur chiefly in association with the latter, though sometimes they are isolated or in separate clusters of few fibres.

Both root and stem bark are decidedly bitter and aromatic, and somewhat astringent to the taste. The aromatic or bitter almond odor and taste in fresh specimens are more pronounced in the root bark. This would lead to the inference that the latter is the more valuable of the two for medicinal purposes.

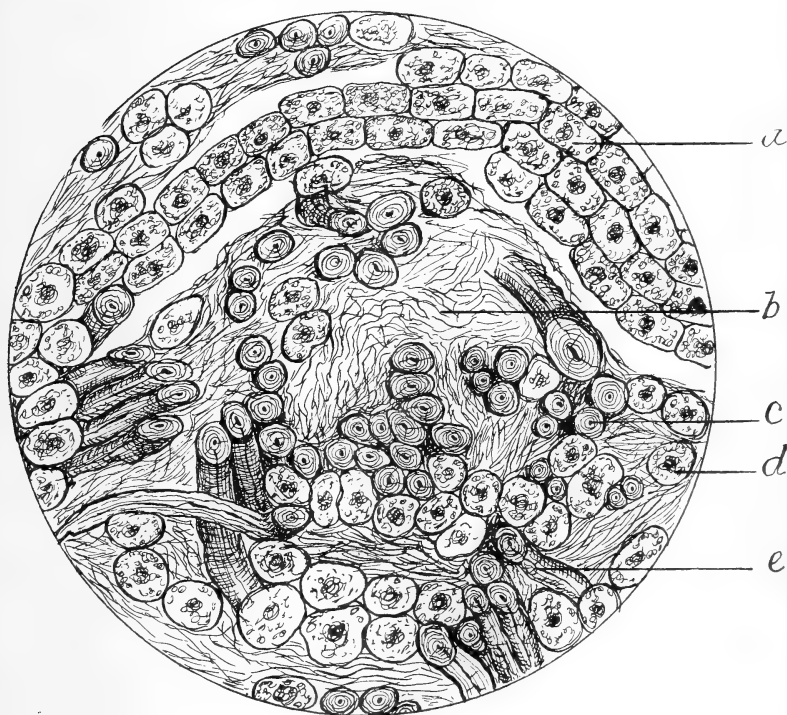


FIG. 8.—Small portion of cross section of inner bark of *Prunus Avium*.

The Stem Bark of Prunus Mahaleb.—The bark on the old stem is dark gray and fissured, though less strongly so than that on the trunk of *Prunus serotina*. There appears to be a greater development of secondary cortex in this species than in *Prunus serotina*, and a corresponding difference in the cork formation. Some of the later-formed bands of secondary cork not merely invade the inner cortex, but in the older bark cut even into the outer portion of the bast layer.

The sclerenchymatous elements are less abundant than in *Prunus serotina*, and consist mostly of small clusters of bast fibres, stone-cells being wholly or nearly absent. The medullary rays are quite similar to those of *P. serotina*, and the intervening sieve elements are, in the older bast areas, likewise much crushed and fissured.

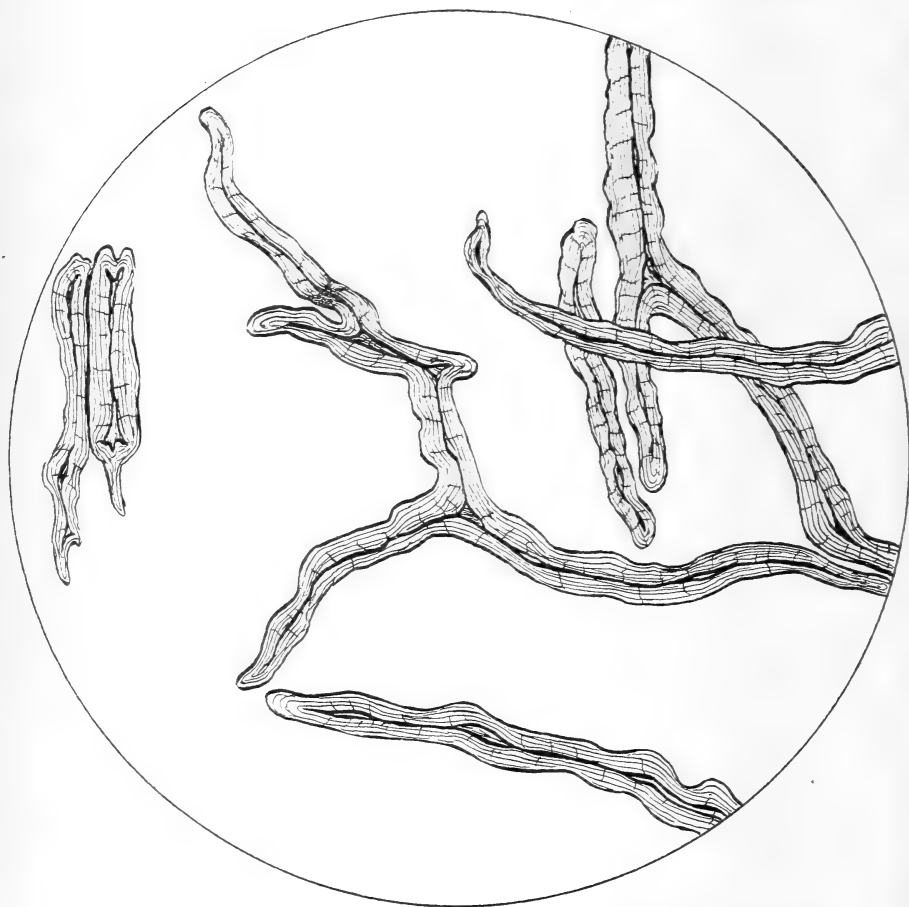


FIG. 9.—Sclerenchyma fibres from *Prunus Avium* as they appeared *in situ* in a longitudinal section.

Crystals of calcium oxalate are abundant, but much less so than in *P. serotina*, and are seldom single in the cells, but in stellate clusters. Probably owing to the season of the year when the bark was gathered, namely, in June, no starch grains were recognized.

The bark has the bitterness and astringency of the official species, but much less of the aromatic quality.

Often the portions of the wood adhering to a medicinal bark afford characters which aid in identification. Between the wood of *Prunus Mahaleb* and that of the official species there are marked structural differences. The ducts of the former are much larger and also less evenly distributed, being most abundant and largest adjacent to and on the exterior side of the ring of growth, so that the rings of growth are rendered much more conspicuous to the eye.

The Stem Bark of Prunus Avium.—The bark of this species is smoother and lighter colored, being reddish-brown on the twigs of the second or third year, and deep gray or reddish-gray on the trunk. The lenticels on the twigs are much fewer than in the official

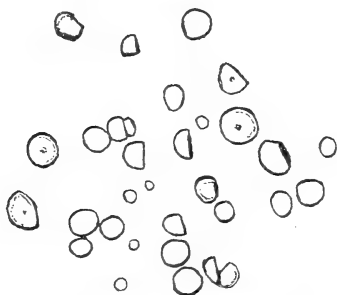


FIG. 10.—Starch from stem bark of *Prunus Avium*.

species, but they are still present and enormously increased in size in trunks 6 inches or more in diameter. They appear as lenticular, transversely elongated, corky patches, often 2 inches or more in length. The outer bark may be easily stripped off transversely in broad bands, exposing the deep green middle bark, and the corky layer, in turn, may be easily split into thin lamellæ, corresponding to the concentric stratification lines seen in the cross-section.

The inner bark shows the wavy medullary rays, terminating very obliquely at the exterior, the wavy bands of compressed sieve tissue in the older portions, and the fissuring between the medullary rays and the bast masses, which are shown in most species of cherry; but it differs from the official species and from some others in the decidedly fibrous character of the bast layer. There are not only scattered and very tortuous lignified fibres in its outer portions, or

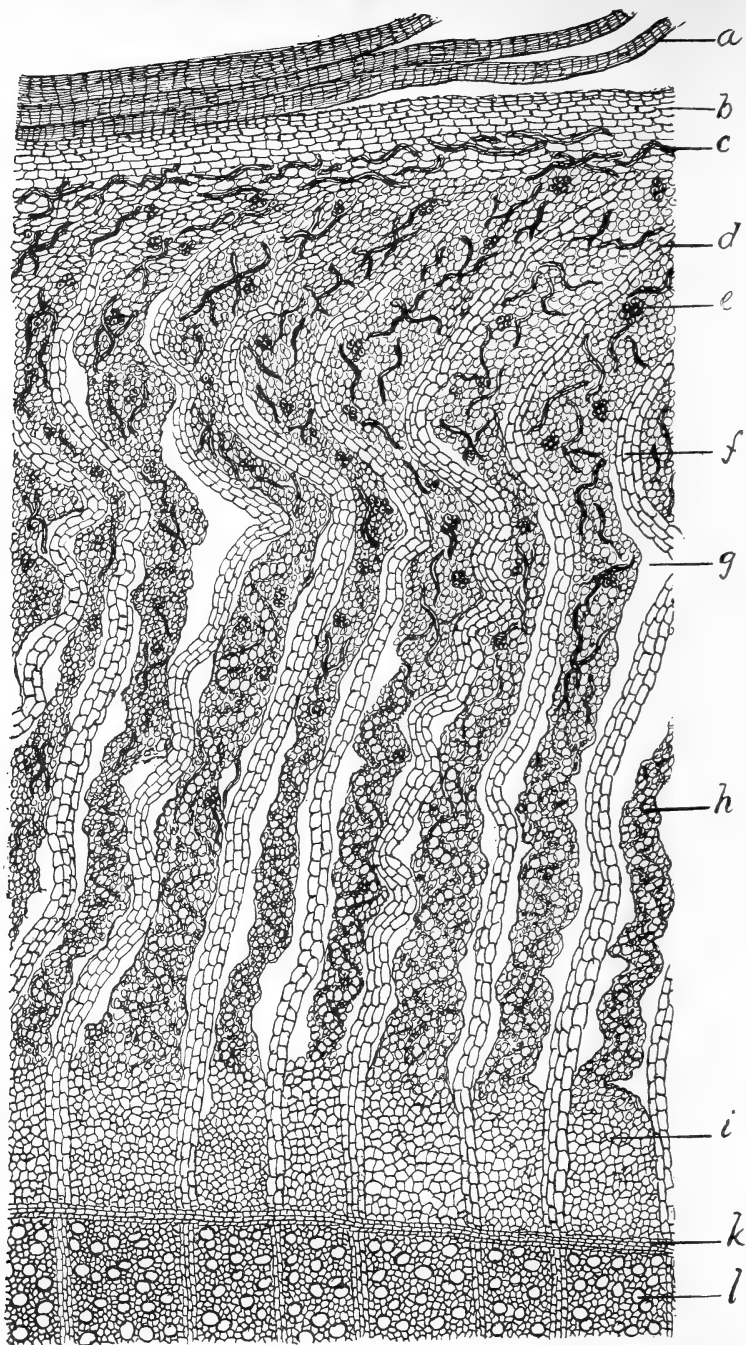


FIG. 11.—Cross section of stem bark of *Prunus Pennsylvanica*.

even extending into the middle bark, but clusters and isolated fibres occur abundantly throughout the bast. Many of the fibres, especially those occurring in bundles, are long and slender, and run quite regularly lengthwise of the bark; but others, especially the isolated ones, are very irregular in form, tortuous in their course, and often branching.

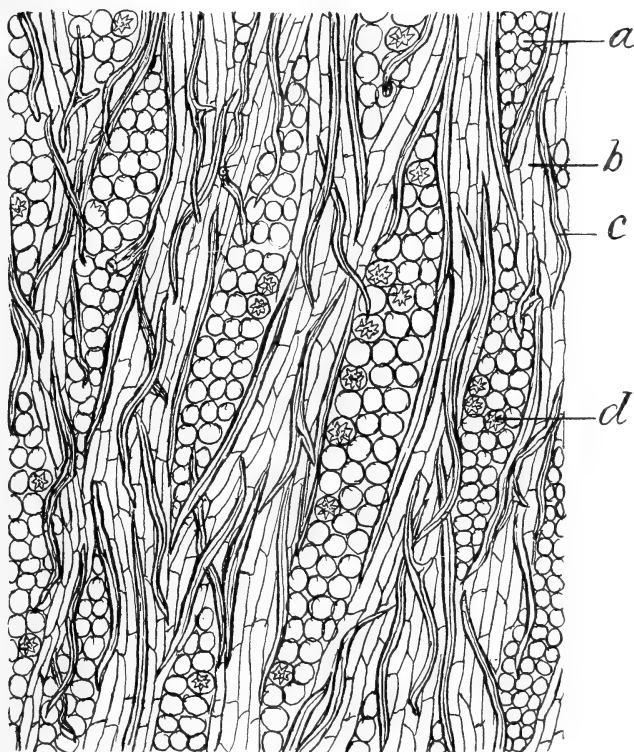


FIG. 12.—From longitudinal tangential section of inner bark of *Prunus Pennsylvanica*.

The masses of bast fibres are never very large, and are not arranged with any apparent order.

Crystals of calcium oxalate in the specimens examined were much less abundant than in *P. serotina*, and they were nearly always in stellate masses.

The specimens studied were gathered in June and July, and in these, starch, though present in the medullary ray-cells, was not

abundant. It was also very fine grained; the grains were often rounded and simple, but also frequently double or triple. The faintly distinguishable hilum is nearly central. The taste of this bark is decidedly bitter and astringent, but the aromatic or bitter almond odor and taste are usually scarcely perceptible.

The Stem Bark of Prunus Pennsylvanica.—This tree, when not in fruit or flower, might be mistaken for a small specimen of *P. serotina*, for the habit is similar, and the bark of the trunk, though usually lighter colored and smoother than that of the official species, is occasionally, in the old specimens, quite dark and rough enough to resemble that of young and thrifty specimens of *P. serotina* of similar size. The lenticels on the twigs, however, perceptible also

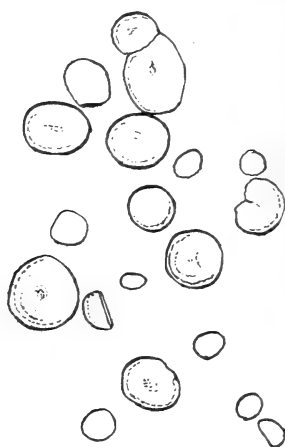


FIG. 13.—Starch from stem bark of *Prunus Pennsylvanica*.

even on the older trunks, are much less numerous. Of course, there would be no difficulty in distinguishing this species when in flower, for its flowers occur in umbel-like clusters instead of racemes; in early instead of late spring; and from separate, lateral scaly buds instead of on the ends of lateral leafy branches. The fruits also are red, on long pedicels, and with a thinner, more acid and not a bitter taste.

The lenticels on the trunk are not so large as those of *P. Avium*, seldom attaining a length transversely of more than half an inch. The corky layer, however, separates from the sub-lying green tissue in a very similar manner, and in cross-section this layer shows a similar, though finer, stratification. When the brown or blackish

scurf is rubbed from the surface of the periderm, a fine red-brown or mahogany color is exposed.

In this species, as in *P. Avium*, there appears to be but a slight development of the secondary cortex. Similarly, the medullary rays of the inner bark are oblique and wavy. They are, however, narrower, being seldom more than three cells broad. The fissuring

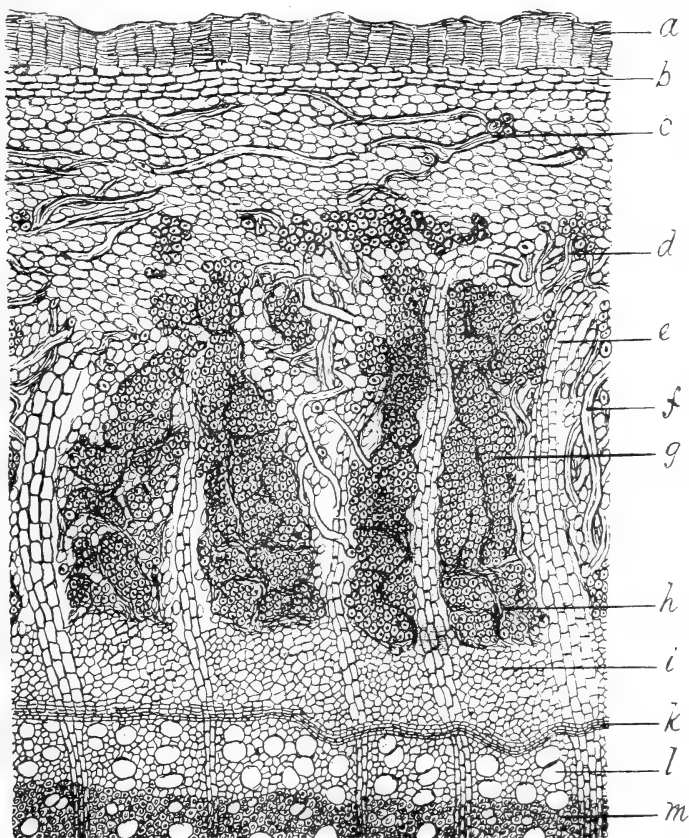


FIG. 14.—Cross section of stem bark of *Prunus Virginiana*.

and the collapsed sieve tissue are also similar. The older portions of the inner bark abound in tortuous and strongly lignified sclerenchyma fibres, similar to those of *P. Avium*, but the clusters of more typical bast fibres are considerably less numerous.

The taste of this bark resembles that of *P. Avium*, being decidedly bitter, somewhat astringent, but scarcely at all aromatic.

Crystals of calcium oxalate abound, and they are mostly in stellate masses.

The starch grains are similar in shape to those of *P. Avium*, but they average of larger size, and compound forms appear to be somewhat less numerous.

Stem Bark of Prunus Virginiana.—This tree, commonly called Choke Cherry, on account of its very astringent fruit, is undoubtedly often confounded with the Black Cherry. This is not only because it is often, in general appearance, similar to that of a small black cherry tree, but because its flowers and fruits are similar in size, color and arrangement, being borne in both cases in racemes. Our pharmaceutical nomenclature also adds to the danger of confusion, the name *Prunus Virginiana* being still absurdly retained as the pharmacal name of the drug obtained from *P. serotina*.

There is no real reason, however, why any one tolerably familiar with the botanical characters of the two species should confound them, for there are marked differences. *P. Virginiana* is, in the first place, a much smaller tree, in fact, usually more a shrub than a tree, though sometimes its stem attains a diameter of two or three inches. Its branches and trunk are not so dark, being rather grayish than blackish, and the lenticels are much less numerous. Its leaves are thin, oval-oblong or ovate, abruptly pointed, and sharply serrate, with slender, projecting teeth, while those of the black cherry are thickish, oblong-lanceolate or oblong and taper-pointed, but less abruptly so than in the other species, and the margins are serrate with incurved, short and callous teeth. The serrations on the leaves of Choke Cherry are also often double, which is not the fact with those of the Black Cherry. The petals of the Choke Cherry are more rounded than those of the Black Cherry.

The microscope, however, reveals the most decided differences in the structure of the barks. The medullary rays in *P. Virginiana*, which are three or four cells wide, are less flexuous than in *P. serotina*, or in any other species examined. Proper stone cells, so abundant in the bark of the Black Cherry, are almost wholly absent from the bark of the Choke Cherry, but the tortuous sclerenchyma fibres, similar to those in *P. Avium* and *P. Pennsylvanica*, not only abound in the inner bark, but in the cortex. Bast fibres of the ordinary form also occur in large and irregular masses in all the

mature portions of the inner bark. By reason, perhaps, of the abundance of bast fibres, the radial fissuring, so observable in all the other species studied, is much less conspicuous in this.

Owing, probably, to the fact that the specimens studied were gathered in the season of active growth, namely, about June 1st, no starch was found in the sections examined.

Oxalate of calcium crystals in stellate masses are abundant in the species.

In aromatic quality and in bitterness, this species is inferior to the Black Cherry, though the bitter almond odor and taste are much more evident than in any of the other species thus far studied.

Another cherry bark, samples of which were sent by Professor Henry G. Greenish, of London, has been examined by the writer, and found to resemble, in most of its structural characteristics, that of our *P. Pennsylvanica*. It differs from the bark of this species, markedly, however, in some particulars, and was probably derived from one of the unstudied Pacific Coast species. The sample was very bitter, somewhat astringent, and slightly aromatic. Professor Greenish states that the sample was taken from a quantity which had been sent to the London market as Wild Cherry Bark.

This outline of the studies thus far made by the writer in this genus must be considered merely as preliminary to a more complete account which he expects to publish at a future time. In the meantime, it is hoped that the descriptions and illustrations here given may be of service to our profession, and aid in emphasizing the importance of the study of the histological structure of drugs.

The writer's thanks are due to Mr. Henry L. Clarke, of the University of Chicago, for securing for him authentic specimens of the bark of *Prunus Virginiana*.

DESCRIPTION OF FIGURES.

Fig. 1.—Transverse section of bark of *Prunus serotina* magnified 75 diameters. The specimen was from a stem only five or six years old. *a*, cork, probably secondary periderm; *b*, middle or green layer of bark; *c*, clusters of stone cells in inner portion of middle bark; *d*, compressed sieve tissue in the outer portion of bast layer; *e*, a medullary ray; *f*, mass of stone cells; *g*, fissure between medullary ray and bast; *h*, medullary ray; *i*, cambium zone; *k*, duct in mature wood.

Fig. 2.—Small portion of longitudinal section made well toward the cambium zone and parallel to it. Magnification about 75 diameters. *a*, crystal of calcium oxalate; *b*, a medullary ray cell containing starch; *c*, sieve tube; *d*, medullary cell.

Fig. 3.—Some of the sclerenchymatous elements from the same species, magnified 230 times; the longer of these cells, perhaps, to be regarded as bast fibres, or as transition forms between stone cells and bast fibres.

Fig. 4.—Starch grains from bark of *Prunus serotina*, magnified 1,200 diameters.

Fig. 5.—Cross-section of bark of *Prunus Mahaleb* magnified about 75 diameters. *a*, cork exfoliating from exterior surface; *b*, secondary cork formation farther interior; *c*, fissure in cortex; *d*, primary bast fibres in outer portion of bast layer; *e*, compressed sieve tissue; *f*, single bast fibre. (A few scattered bast fibres occur in the secondary bast in this species.) *g*, medullary ray; *h*, compressed sieve tissue; *i*, newly formed bast; *k*, cambium zone; *l*, large duct in newly formed wood; *m*, wood of previous season.

Fig. 6.—Tangential section through bast layer of *Prunus Mahaleb*, showing medullary rays and compressed sieve tissue. Magnification about 230 diameters.

a, compressed sieve tissue; *b*, crystal cell; *c*, ordinary parenchyma cell of medullary ray; *d*, compressed sieve tissue; *e*, fissure between medullary ray and sieve tissue.

Fig. 7.—Cross-section of outer part of bark of *Prunus Mahaleb*, showing mode of cork formation. *a*, outer layers of cork exfoliating at the surface and showing stratification lines. (The cork readily splits along these lines.) *b*, cortex or middle bark; *c*, cluster of primary bast fibres; *d*, secondary cork forming interior to the clusters of primary bast fibres; *e*, compressed sieve tissues. Magnification about 75 diameters.

Fig. 8.—Small portion of cross section of inner layer of stem bark of *Prunus Avium*, magnified about 230 diameters, showing arrangement of bast fibres. *a*, portion of medullary ray, well toward the outside of the bast layer; *b*, compressed sieve tissues; *c*, bast fibre; *d*, parenchyma cell; *e*, bast fibre, in oblique view.

Fig. 9.—Some of the sclerenchyma fibres as they appeared *in situ* in a longitudinal tangential section of the bark of *Prunus Avium*. Magnification, about 230 diameters. The more regular, slender and elongated fibres usually occur in masses.

Fig. 10.—Starch grains of *P. Avium* magnified 1,200 diameters.

Fig. 11.—Cross-section of the stem bark of *Prunus Pennsylvanica* magnified about 75 diameters. *a*, cork in layers, represented as separating from the middle bark; *b*, irregular or tortuous sclerenchyma fibres; *d*, medullary ray; *g*, fissure between medullary ray and bast; *h*, compressed sieve tissue; *i*, young bast tissues near cambium; *k*, cambium zone; *l*, a duct in the wood.

Fig. 12.—Portion of longitudinal tangential section of inner bark of *P. Pennsylvanica* magnified about 75 diameters. *a*, medullary ray; *b*, soft bast cell; *c*, bast fibre; *d*, crystal cell.

Fig. 13.—Starch from bark of *Prunus Pennsylvanica* magnified 1,200 diameters.

Fig. 14.—Cross section of stem bark of *P. Virginiana*, magnified about 75 diameters. *a*, periderm; *b*, outer cortex (collenchyma); *c, d*, tortuous sclerenchyma fibres; *e*, medullary ray; *f*, sclerenchyma fibre; *g*, large mass of secondary bast fibres; *h*, compressed sieve tissues separating masses of bast fibres; *i*, younger bast; *k*, cambium zone; *l*, duct in newly formed wood; *m*, mature wood.

CHINQUAPIN (CASTANEA PUMILA, MILL.).

BY HENRY KRAEMER.

Presented to the Am. Pharmaceutical Association, Denver Meeting, 1895.

More than a year ago Berthelot claimed that with the progress of science the time was coming when synthetic foods, from the laboratory of the chemist, would supply the world with life, instead of the agricultural products which have been used from time immemorial. Beginning with the well-known syntheses of acetylene and urea, he would build up, after the manner of the chemist, the constituents that seem to be the active principles of the plant and animal foods. He believes, for instance, that by reason of the synthesis of the alkaloids of tea, coffee and cocoa, from urea, that these plants will soon follow like madder into economic eclipse. Dr. Wiley, in his retiring address as President of the American Chemical Society (December, 1894), calls attention to the fact that "no attempt is made to compute the cost of caffeine necessary for a single cup of Java, and that the fact that caffeine is only one of its constituents is naively ignored."

However beautiful the work and convenient the results may seem to be to Berthelot and others, it will be necessary for the whole animal creation to undergo marked changes in its digestive organs before they can be adapted to the use of synthetic or concentrated foods, or the so-called active constituents of foods. It is extremely doubtful if starch and gluten can take the place of wheat, or that any of the constituents of our garden vegetables could ever be produced in sufficient quantity to replace them; or that our fruits could, with due regard to the healthfulness of the race, ever be replaced by synthetic products; or, if myocine, sarcine, karnin, kreatin, etc., could ever replace meat. The human stomach must be nearly filled at least once a day for the individual to be healthy. It is only in the case of invalids that synthetic or concentrated foods will have any avail. Man must have not only carbohydrates, like starch and sugar; hydrocarbons, like fat and oil; nitrogenous principles, like proteids, fibrin, casein, gelatin; salts, like $\text{Ca}_3(\text{PO}_4)_2$, NaCl , KCl , etc., but he requires crude fibre, cellulose, etc., being the so-called inert constituents of plants, to assist digestion, even if they do not impart strength and life. One might as well talk of breathing oxygen alone, because the oxygen alone is required by the

blood in changing the hæmoglobin of venous blood to oxyhæmoglobin of the arterial food.

Ever since Joule demonstrated the mechanical equivalent of heat, physiologists have been at work to ascertain the number of foot-pounds of work which the different foods will yield. So that to the different kinds of food are assigned physiological functions; to carbohydrates and hydrocarbons is ascribed the power of begetting force, and from nitrogenous substances is obtained the source of supply in replacing the waste of nitrogenous tissues, while any excess assists the starch and oil in their province of keeping up animal heat. "After the supply of sufficient albuminoid matters in the food to provide for the necessary renewal of the tissues, the best materials for the production of internal and external work are non-nitrogenous matters, such as oil, fat, sugar, starch, gum, etc. When the work is increased, not so much extra meat, as vegetable food, or its dietetic equivalent, fat, is demanded." In view of these statements and facts, it seems to the author that any plant that is fairly rich in starch, oil and nitrogen is worthy of at least a record. The author refers to the fruit of the chinquapin (*Castanea pumila*, Mill.), to which he has devoted some attention.

Castanea pumila, Mill.,¹ has been variously called by systematic botanists: *Fagus pumila*, Linnæus; *Fagus Castanea pumila*, Marshall; *Fagus pumila* var. *præcox*, Walter; *Castanea nana*, Muhlenberg; *Castanea alnifolia*, Nuttall; *Castanea vesca*, Lesquereaux. It varies from a small spreading shrub to a small-sized tree (15 meters high, with a trunk 0.30 meters in diameter). It has a dark greenish-colored bark, marked transversely with whitish lenticels and elliptical patches of a lichen. The wood is light-colored and marked by broad annular rings. The summer wood contains several rows of large ducts. The young green branches are covered with minute one-celled trichomes. The bark is rather tough, bast fibres numerous and long, taste astringent, and is sometimes employed as a tonic. The leaves are elliptical, oblong or lanceolate, acute with rounded base, mucronate-serrate, upper surface smooth, lower surface marked by clusters of long one-celled trichomes. This tomentose character of the under surface of the leaves distinguishes the chinquapin

¹ Tenth Census of U. S., Vol. IX, 1880, entitled, Forest Trees of North America.

from the young chestnut. The leaves are 9 to 15 centimeters long by 3 to 6.5 centimeters at the widest portion.

The flowers are aments or catkins and are of two kinds. The lower are staminate, being 14 centimeters long, calyx 5 to 6 parted, stamens 5 to 20, filaments slender, anthers two-celled. The fertile flowers are above, fewer and are interrupted. The catkins are 6 to 7 centimeters long, usually one, sometimes two clustered together, with an ovoid scaly involucre, covered with trichomes, which in the fruit becomes coriaceous and beset with prickles, and is 4-lobed. Nut is solitary in the burr, ovoid, 11 to 16 mm. long by 7 to 12 mm. wide. The bees derive honey from the flowers during early summer (June).

The chinquapin grows¹ from Lancaster County, Pa., and the Valley of the Lower Wabash River, Indiana, south and southwest to Northern Florida and the Valley of the Neches River, Tex. It has been found in Southern New Jersey and the adjoining corner of Pennsylvania, along the Delaware River. In the Atlantic States it is reduced to a shrub and attains its maximum development further south. It grows on rich hillsides, borders of swamps, and is especially seen on the borders of roads, clearings, etc. It is suggested as suitable for an economical hedge. It is most common and reaches its greatest development in Southern Arkansas.

The wood of the chinquapin is light, hard, strong, cross-grained, durable in contact with the ground, and liable to check in drying. It equals that of the chestnut. In sp. gr. it is 0.5887; ash, 0.12 per cent., and weighs 36.69 pounds per cubic yard. It has the following strength and fuel value:

Approximate relative ² fuel value	58.80
Coefficient of elasticity in kgms. per mm.	1,141
Ultimate transverse strength in kgms.	423
Ultimate resistance to longitudinal crushing in kgms.	7,923
Resistance to indentation to 1.27 mm. in kgms.	1,887

¹ Agricultural Department Reports: 1854, 410; 1860, 421; 1868, 281; 1875, 175.

²(1) The fuel value is obtained by burning the wood in a combustion tube in a current of oxygen and determining the per cent. of C from CO₂, collected in the KOH bulb, and the H from the amount of H₂O found in the CaCl₂ tube. Then knowing the specific gravity and ash by the usual calculations for calorific value of fuel, the fuel value per kilogramme, or per cubic decimeter or approximate relative value of the wood, may be calculated.

(2) The strength of wood is ascertained by means of "testing machines,"

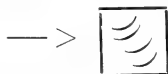
The nuts, or "chinquapins," as they are called, are much sought, and so soon as ripe are eagerly eaten by those who first see them. 88.116 gms. of whole nuts gave 28.785 per cent. of hulls and 71.215 per cent. of "meat" or kernel. The kernels were cut up and dried in an air bath at 110°, and were found to contain 18.17 per cent. of moisture.

For the determination of oil, 15 gms. of the powdered kernels were extracted in a Soxhlet extraction apparatus, with anhydrous ether, for eight hours. The contents were poured into a large platinum dish, the ether evaporated and the contents weighed.

Weight of platinum dish and oil	50,880
Weight of platinum dish alone	49,605
	<hr/> 1,275

The percentage of oil then on dried material was 8.50 per cent., or on the fresh chinquapin kernel 6.955 per cent. The starch was

which may be either for small or large beams. The specimens are first slowly and carefully seasoned. In determining the *Resistance to Transverse Strain* they are generally made 4 cm. square, and are long enough to give the necessary bearing upon the supports. The supports are shod with flat iron plates, and set exactly one meter apart. The specimens are placed upright to eliminate the influence of this weight, and hydraulic pressure is applied by means of an iron rod, acting midway between the supports when the deflection is read. In these tests (see Vol. IX, 10th Census of the United States), the pressure was applied as indicated by the direction of the arrow



The pressure is applied slowly and uniformly. The first deflection was at 1,173 and the second at 1,141 kgms. Formula for *Coefficient of Elasticity* is

$$E = \frac{Pl^3}{4\Delta bd^3}$$

The dimensions l , b , d , being expressed in mm. and P in kgms. The formula for *Modulus of Rupture*, is

$$R = \frac{3Pl}{2bd^2}$$

The dimensions l , b , d being expressed in cm. The modulus of rupture of *Castanea pumila* is 991, and the ultimate transverse strength in kilogrammes is 423.

(3) In the *Longitudinal Compression Test* the specimens were 4 cm. square and 32 cm. long. The specimens were introduced between the platform of the machine and pressure gradually applied until they failed. The figure given represents the number of kgms. required to cause failure.

(4) *Resistance to Indentation*. Specimens were 4 cm. square and 16 cm. long, and pressure was applied perpendicularly to the fibres. Upon the plat-

determined as follows: 2·000 gms. of the finely powdered kernels deprived of oil were put into a pressure bottle with 100 c.c. of water, and heated for eight hours at 130–140° C. It was then allowed to cool to 60° C., and 10 c.c. of HCl (sp. gr. 1·20) added, and sufficient water to make the bulk 100 c.c. The bottle was then heated at 60°–70° C. for two hours. The contents were then filtered, neutralized and made up to 500 c.c. A portion was titrated with Fehling's solution (5 c.c. = 0·50 glucose). 26·50 c.c. of chinquapin solution completely precipitated 5 c.c. of Fehling's solution, which, calculated, showed 47·17 per cent. of glucose. This was equivalent to 44·45 per cent. of starch in the dried kernels, or 36·37 per cent. on the fresh kernels.

A nitrogen determination was made by means of the combustion of 1·000 gm. of powdered chinquapin, and gave 25·2 c.c. of nitrogen. Then from the following data and formula the per cent. of nitrogen was determined:

form of the machine they were indented with an iron punch 4 cm. square on its face, covering the entire width of the specimen and $\frac{1}{4}$ of its length at the centre. The results are different according to the direction of the grain, when, as in the previous illustrations, a pressure of 2,395 kgms. produces an indentation of 2·54 mm., whereas, when the grain is parallel 2,608 kgms. = 4·81 mm., producing a slight shearing of the fibres. The following comparative table will illustrate the value of these figures, and is taken from the Tenth United States Census, which is the only comprehensive work in timber physics ever undertaken on American timbers:

Coefficient of elasticity in kgms. on mm.	Ultimate transverse strength in kgms.	Ultimate resistance to longitudinal crushing in kgms.	Resistance to indentation to 1·27 mm. in kgms.	Species.
1,658	—	—	—	<i>Larix occidentale.</i>
1,141	423	7,923	1,887	<i>Castanea pumila.</i>
971	386	8,183	3,388	<i>Quercus alba.</i> [cana.
856	297	6,106	1,698	<i>Castaneasativa</i> var. <i>Ameri-</i>
—	541	—	—	<i>Quercus chrysolepis.</i>
—	—	13,767	—	<i>Rhizophora mangle.</i>
—	—	3,395	—	<i>Asimina triloba.</i>
—	—	—	12,689	<i>Canella alba.</i>

$$V = 25.2 \text{ c.c.}$$

$$t = 20.5^{\circ} \text{ C.}$$

$$B = 757.$$

$$f = 17.4.$$

$$p = 0.0012562. \quad V \cdot \frac{1}{1 - (0.00367 \cdot t)} \cdot \frac{B - f}{760}$$

$$p = 0.0288.$$

From this the per cent. of nitrogen on the natural or fresh kernels was calculated, and found to be 2.357 per cent.

One quart of chinquapins was bought in Asheville, N. C., on October 11, 1894, at 10 cents. (They were probably three or four weeks old.) This quart contained 729 chinquapins. These were kept until June 1, 1895, and yielded in all 166 worm-eaten nuts, being in per cent. 22.77. This showed that 77.22 per cent. were fit for planting or fit for eating, although a much larger per cent. are eaten at first, as the worm is not given time to develop.

The grub that feeds on the chinquapins is the larva (according to L. O. Howard, of the Division of Entomology of U. S. Department of Agriculture) of a Coleopterous insect belonging to the genus *Balanus*, and is probably either *B. proboscideus* or *B. rectus*.

Conclusions.—(1) The chinquapin contains the following :

	Per cent.
Fixed oil (sweet and bland)	6.955
Starch (resembling wheat)	36.37
Nitrogen	2.35

This analysis shows that it contains a fair amount of nutritive properties.

(2) The flavor of the chinquapin is equal to that of the chestnut, and is eagerly sought and eaten in the country where it grows.

(3) The chinquapin is limited in its natural range to the region from Pennsylvania and Indiana, to Florida, and southwestward to eastern Texas. It prefers a permeable, rich, rocky soil, but will endure almost any soil except a wet one. (Fernow.)

(4) It will yield fruit in the second or third year, at least, requires no care, and might be advantageously planted and improved by those who are "land poor," as yielding a profitable investment and immediate returns.

SCHOOL OF PHARMACY OF

NORTHWESTERN UNIVERSITY.

EXAMINATION OF ELM BARK, FLAXSEED AND MUSTARD FOR STARCH.¹

By J. U. LLOYD. —

Presented to the Amer. Pharm. Assoc., Denver meeting, 1895.

Owing to the alterations in our library building, necessitating the storing of its contents, it is impossible for me to refer to the literature connected with this subject. References thereto will, perhaps, be added later.

The immediate object is a consideration of the subject of starch in connection with the aforementioned substances, a subject now of great importance to Ohio pharmacists. The question is, does elm bark contain starch at all; do flaxseed and mustard, if free from starch-bearing seeds, ever contain starch, and is it practical in commerce to apply the rigid tests of the Pharmacopœia to ground flaxseed and powdered mustard?

In *Chem. Zeitung*, 1890, p. 688, the following statement is found, coming from Prof. Hilger, in Erlangen:

"Small quantities of starch grains, of various origin, if found in ground spices, should not, by necessity, detract from their being considered as honest goods in trade."

ELM BARK.

The inner bark of *Ulmus fulva*, Michaux (nat. ord. Urticacæ).

In flat pieces, varying in length and width, about 3 mm. thick, tough, pale brownish-white, the inner surface finely ridged; fracture fibrous and mealy; the transverse section delicately checkered; odor slight, peculiar; taste mucilaginous, insipid.—U. S. P.

It will be observed that no chemical test is given by which we can be governed concerning adulteration of the powdered bark. In referring to other authorities, little information is to be found, and even their brief statements concerning the presence of starch do not agree. Since the larger share of elm is consumed as powdered elm, and since druggists do not powder it, but rely altogether on trade millers, the subject of simple tests and rules as to purity are now, in Ohio, at least, of great importance. In the face of conflicting reports made by advocates who claim that elm bark does not contain starch, and those who claim that it does contain starch,

¹ For valuable assistance in detail work, the thanks of the author are extended to Dr. Sigmond Waldbott.

these results are offered simply as voicing the result of my personal experimentation on this now important subject.

If a slab of dried elm bark be split longitudinally, and the exposed edges moistened with very weak iodine tincture, a light purplish-blue color, more or less prominent, follows, which disappears quickly. If the bark be previously moistened with dilute sulphuric acid, the blue color is quite permanent. The same is true when it is moistened with a dilute solution of iodine in iodide of potassium, acidulated with sulphuric acid. Ten specimens taken by me at random from a lot of Wisconsin bark, and others from Kentucky and Ohio, demonstrated that all of them would respond to the test, and I have found none that did not do so, although some specimens of bark contain more starch than others. If a thin shaving, not of the inner side of a slab of elm, be dropped into a dilute solution of iodine in iodide of potassium, made acid with sulphuric acid, the shaving will usually turn blue, or become streaked with blue, although, as the inner surface of the bark is often free from starch, the shaving must be from beneath the surface. In this connection it should be added that this starch-free layer is of varying thickness, sometimes being a mere film, again (seldom) forming the bulk of the bark. Under these conditions, it is to be presumed that enough starch must be present in powdered elm to make it respond to the iodine test.

To Detect Starch.—Powder the elm bark, and thoroughly mix 1 gramme with 100 c.c. of water, by rubbing in a mortar, the water being gradually added; then boil.

To 2 c.c. iodine test solution, U. S. P., add 8 c.c. 10 per cent. sulphuric acid.

Mix 1 c.c. of the iodine mixture with 8 c.c. of the cold mucilage; a clear, quite permanent blue color will be produced. If iodine tincture without acid be added to the mucilage, the blue color will be developed, but disappears quickly. If the mucilage is to be made of the whole bark, shave it transversely into thin shavings, put 1 gramme into a capacious mortar and rub constantly with 100 c.c. of boiling water, gradually added, until a thick mucilage results.

The coloration that results in presence of too much iodine is not bright blue, for if an excess of iodine is used, a shade of purple or brownish yellow results. It is essential that no excess of iodine be

employed, and, when the yellowish shade results, additional mucilage must be added to counteract the excess.

ASH.

Incineration of seven specimens showed the presence of 8.62, 9.13, 9.22, 7.64, 8.10, 8.08, 10.10 per cent. of ash respectively, the average being 8.69 per cent.; observed maximum, 10.10 per cent.; observed minimum, 7.64 per cent. Each of the foregoing results is the average of several incinerations of the same specimens of bark, which agreed very closely.

SUMMARY.

Elm bark contains starch, enough to respond to the iodine test, and this fact should be stated in the Pharmacopœia. It should also be stated that when powdered elm is boiled with water the mucilage, if acidulated with sulphuric acid, on the addition of dilute iodine solution, should turn blue, and retain its color for some time. Elm bark contains so little starch that, in my opinion, a comparative test can be easily devised that will determine any fraudulent admixture of starch, and in justice to the trade a method to detect added starch should be recorded in the Pharmacopœia. The Pharmacopœia should also limit the amount of ash.

Elm bark contains a natural constituent, capable of disturbing the iodine starch test, for if a blue solution, made by adding freshly prepared iodide of starch to water to distinct coloration, be mixed with its bulk of mucilage of elm, the mixture will be immediately decolorized. The blue color will be partly restored by the addition of dilute sulphuric acid.

According to preliminary experiments this phenomenon is most probably due to the presence of both tannin and an organic calcium compound, which may be isolated from the bark. Report on these constituents is reserved for the future.

FLAXSEED.

The seed of *Linum usitatissimum*, Linné. (nat. ord. Lineæ).

About 4 or 5 mm. long, oblong-ovate, flattened, obliquely pointed at one end, brown, glossy, covered with a transparent, mucilaginous epithelium, which swells considerably in water; the embryo whitish, or pale greenish, with two large, oily, plano-convex cotyledons, and a thin perisperm; inodorous; taste, mucilaginous, oily and bitter.

Ground linseed (linseed meal or flaxseed meal) for medicinal purposes should

be recently prepared, free from unpleasant or rancid odor. When extracted with carbon disulphide, it should yield not less than 25 per cent. of fixed oil.

The filtered infusion of ground linseed, prepared with boiling water and allowed to cool, has an insipid, mucilaginous taste, and should not be colored blue by iodine T. S. (absence of starch).—U. S. P.

In this connection, as no exception has been made to the statement concerning the proportion of oil, that substance is herein neglected.

As regards the starch, the statement has been made that immature flaxseed contains that substance, a point that I have had no opportunity to verify. With a view to establishing the fact as to whether commercial flaxseed contains starch, a number of samples of selected flaxseed were tested. In no case could starch be found.

Upon testing the ground flaxseed of the market, however, it was found that every specimen examined responded to the starch test, some contained starch in very large amounts, and it was not without surprise that the fact was shown that the ground flaxseed sold to my own establishment had been grossly adulterated and contained at least 20 per cent. of starch. Neither was it less of a surprise to find that flaxseed ground by responsible parties and offered as pure, and believed by them to be pure, gave a decided blue coloration, and would not conform to the demands of the Ohio Pure Food and Drug Commissioner. Upon investigation it was found that flaxseed is often mixed with such cereals as rye and wheat, and that growing fields of flax are often largely contaminated with volunteer cereals. In addition, the seed is often put into meal and flour sacks and becomes impure thereby. The farmer does not, cannot, separate these foreign seeds, the oil miller cares little, if at all, for the contamination, and hence, since linseed oil makers are the parties who produce the ground flaxseed of commerce, and grind for market the quality of seed they press for oil, it is readily seen that commercial ground flaxseed cannot be expected to withstand a searching starch test. Of course, these remarks do not apply to mixtures designed intentionally as adulterations. That flaxseed can be cleaned in quantities is, however, shown by the fact that in wholesale seed stores in Cincinnati I have succeeded in picking up flaxseed free from starch-bearing contaminations.

It is my opinion that if a universal demand arises for pure flax-

seed meal it will be followed by a trade supply that will conform to the starch test of the Pharmacopœia, but naturally at increased price.

The pharmacopœial test is, I believe, objectionable by reason of the unnecessary direction to filter the infusion, which, owing to its mucilaginous nature, is troublesome to say the least. It may also be made more specific as to details, and, owing to the growing importance of this subject, nothing should be left to conjecture.

The test as I apply it is as follows :

Boil 1 gramme of ground flaxseed with 20 c.c. of water, and cool.

Mix 0.2 c.c. test solution of iodine, U. S. P., with 10 c.c. of 10 per cent. sulphuric acid.

To 8 c.c. of the flaxseed mucilage add 2 c.c. of this iodine compound, when, if starch is present, a blue coloration will result. As little as 0.5 per cent. of starch is indicated by a strong reaction.

An admixture of but 0.3 per cent. of starch is easily recognizable by this iodine test. Even the presence of as little as 0.1 per cent. of starch may also be recognized by making the mucilage more concentrated, using only 10 c.c. of water, instead of 20 c.c., to 1 gramme of flaxseed.

MUSTARD.

Free from starch.—U. S. P.

If commercial mustard seed be examined it will be found, as a rule, mixed with foreign seeds. Among these are to be found starch-bearing seeds, especially the seed of *Chenopodium* (American wormseed), this being often present and containing much starch.

If this mixed mustard be powdered and tested by the usual iodine method with small amounts of iodine, it will be found, even in the presence of much starch paste, that the reaction will be indistinct or evanescent, if it develop at all. This is due to the action of iodine on volatile mustard oil. In this connection it may be said that when a few drops of oil of mustard are stirred into an excess of iodized starch mixture, the blue coloration will soon be removed.

As a result of a series of experiments that were made in order to arrive at an expeditious method to eliminate the iodine-absorbing power of mustard oil prior to the testing for starch, the following process gave the greatest satisfaction :

Put into a large test tube 0.5 gramme of the ground mustard seed, add 8 c.c. of water and 1 c.c. iodine test solution, U. S. P. Boil until the brown color has disappeared. Decant, cool the decanted liquid, and add, by means of a pipette, *one drop* of the iodine test solution, U. S. P. If as little as 0.1 per cent. of starch be present, a distinct and quite permanent blue or greenish-blue color will appear.

If the principle of boiling the infusion of mustard seed with the iodine solution be not adhered to, the starch reaction will be evanescent, even in the case of gross admixtures of flour.

As the Pharmacopœia demands that no starch be present (and I can find none in pure mustard seed), it should be shown explicitly how the presence of starch can be determined.

GENERAL SUMMARY.

Elm bark contains starch.

Flaxseed and mustard, both white and black, free from admixture, do not contain starch.

The presence of small amounts of some foreign seeds that are difficult to separate, and of grains of cereals, are common in both flaxseed and mustard, and generally carry sufficient starch to make the powder respond to starch tests, if properly applied.

In the case of elm bark, the blue coloration disappears very quickly unless acid is added. After this blue color has faded, it can be partly revived by the addition of sulphuric acid.

With mustard, the blue color also disappears, if an insufficient amount of iodine be added, because the latter is readily assimilated by the volatile oil of mustard, even in the presence of a large amount of starch. Sulphuric acid does not revive the blue coloration; but previous heating with an excess of iodine test solution saturates the mustard oil, and renders the starch reaction quite permanent.

With flaxseed, the blue coloration of starch remains for some time, but in contradistinction to the behavior of mustard, an excess of iodine must be avoided, in order to obtain the pure blue color of iodide of starch. In commerce, ground flaxseed is not, so far as I know, supplied starch-free, but it can be easily obtained without any intentional admixture. Ground mustard now and then is pure, but, owing to unintentional contaminations, it usually responds to the

starch test, if properly applied. It can easily be purchased free from adulteration, but not necessarily entirely free from starch-bearing seeds.

In no case is it desirable to attempt to filter any of these mucilages, the Pharmacopœial directions to this effect being, in my opinion, objectionable.

TARAXACUM ROOT AND TARAXACIN.

BY L. E. SAYRE.

Presented to the Amer. Pharm. Assoc., Denver Meeting, 1895.

As a continuation of the investigation mapped out for myself a few years ago in connection with taraxacum, and reported upon in 1893 and 1894, I desire at this time to present the results of further work during the past winter in the same direction. It may be remembered that an effort has been made to determine the variation in the root at different seasons of the year, and to determine whether the valuable constituents are to any great extent altered by the application of a low heat, such as might be used in drying the fresh drug.

During the past year an effort has been made to determine the nature and characteristics of the so-called bitter principle—taraxacin—and to this end my investigations have been chiefly directed. The first difficulty in isolating the active principle lay in the separation of it from the extraneous matter with which it is always contaminated when its colorless aqueous solution is evaporated. This extraneous matter was referred to in a former paper (*Proceedings of A. Ph. A.*, 1893, p. 78), when it was stated that all attempts to obtain the bitter principle in a crystalline form, free from admixture of brownish-red extractive, had been unsuccessful, and what was reported as taraxacin in the analysis was this crude bitter principle containing this extractive.

It seemed impossible to separate the small, needle-like crystals from the resin-like globules of other uncrystallizable material seen under the microscope, and whether these uncrystallizable, amorphous globules of extractive, or the crystals, were actually the bitter principle, it was almost impossible to tell. My efforts have been directed towards this particular problem—how to obtain the taraxacin in the pure state. If it be a crystalline body, how can

this body be separated from the above-mentioned amorphous substance or substances? For help in the work I am indebted to Mr. A. B. Clarke, a student in the School of Pharmacy of the University of Kansas.

A record of the work will show, probably, that a separation of the bitter principle has been accomplished, and in the present paper an attempt will be made, not only to show this, but to make clear the various steps in the process, so that others may be able to take up the subject, or follow the ground gone over, and thus be able to verify or disprove the statements made herewith. At the same time, an attempt will be made to offer a process for the separation of the acrid principle which exists in the root.

In the work during the year, the various preparations of the drug were used as starting-points, viz.: the chloroformic extract, the extract and the fluid extract. It is unnecessary to take up each one of these divisions in detail and refer to the many failures and the causes of them. Reference will be made to such parts of the work as yielded results which I desire to record for the benefit of those who will, at a future time, wish to verify it.

Coloring Matter.—A point worthy of note has been hinted at in a former paper, namely, that the root, at a certain time in the late fall, seems charged with a coloring matter almost entirely absent at other seasons. On going over this part of the work again this year, I found that the October root was of a much higher color, and contained this peculiar coloring principle, which was entirely absent in the root collected in September. This coloring principle was obtained nearly pure by dissolving it from the chloroformic extract with alkaline water, and precipitating it from the alkaline solution with an acid. It is very sensitive to acids and alkalies; with the former yellow, and with the latter a deep red color is produced.

Acrid Principle.—One ounce of the extract was mixed with clean white sand, and dried in an oven at a temperature of 65° C., and powdered. This powdered extract was very hygroscopic, taking up water and becoming caked together when allowed to stand in the air but a short time. The powdered extract was placed in a continuous extracting apparatus and treated with chloroform for ten hours. The chloroformic extract was nearly colorless. The heat used in the manufacture of the extract seemed to have ren-

dered most of the coloring matter insoluble in chloroform. There was, however, a small amount in solution, which became visible upon concentration, and on complete evaporation a yellow mass, of pasty consistency, remained, having an acrid and very bitter taste. The residue was dissolved in water, and one-third of the yellow solution placed in a vacuum desiccator and allowed to evaporate. This gave no crystals, but the residue was highly colored, and had an odor resembling caramel. This was again dissolved in water, and shaken with absolute ether. The ether was then drawn off, and, on evaporation, left a residue which was not crystalline, but had an intensely sharp, acrid taste—not bitter.

Taraxacin—Four ounces of a fluid extract, prepared by repercolation, were diluted with an equal bulk of water, and a dilute solution of subacetate of lead added, until no further precipitation was produced. The precipitate was mixed with water, and hydrogen sulphide passed through the mixture, until the lead was all deposited in the form of sulphide. The mixture was then filtered, and the filtrate evaporated to dryness on a water bath. The residue showed no signs of bitterness, making it evident that the bitter principle had not been precipitated by the subacetate of lead.

The first filtrate from the precipitate formed by the subacetate of lead was then taken and freed from lead by passing hydrogen sulphide through the solution and filtering out the lead sulphide formed. The filtrate was then evaporated to dryness, leaving behind a yellow, pasty mass of intensely bitter and acrid taste. The mass was mixed with sand and dried in an oven at 55° C. for three days, but the residue did not dry sufficiently to be powdered. It was divided into small particles and macerated in chloroform. The chloroformic extract, on being evaporated, left a large crop of crystals nearly free from foreign matter. The residue was very bitter.

This bitter residue gave glucosidal reactions, but when the drug was treated by the lime process for the separation of glucosides—viz.: the powdered drug mixed with freshly prepared milk of lime and evaporated to dryness on a water bath and the residue extracted with alcohol—no evidence of the bitter principle could be found in the residue after evaporating the alcohol.

Of the processes employed in separating the taraxacin thus far, the one using the solution after precipitating with subacetate of lead is by far the most satisfactory; but in any of the processes it

is necessary to use a large amount of the drug, as the principle exists in the root in very small quantities (about 0.05 per cent.).

It was found during the investigation that the acrid principle existing in the root could be separated from the bitter principle by shaking an aqueous solution of the chloroformic extract of the extract with absolute ether, drawing off the ether and allowing it to evaporate, when a yellowish mass, having a very sharp, acrid taste, remained. This residue dissolved in water and was acid to litmus paper. The relative amount of this acrid principle contained in the drug was not determined, but the percentage is very small.

It is now thought that a plan has been mapped out by which future investigators, using large quantities of the drug, will be able to completely isolate the bitter principle, or taraxacin, from taraxacum root, and by elementary analysis determine its ultimate composition. Fifty pounds of the drug have been extracted with chloroform, and during the next winter it is hoped this work will be fully accomplished.

BRITISH PHARMACEUTICAL CONFERENCE.

The thirty-second annual meeting of this Association was held at Bournemouth, England, July 30 to August 1, 1895, inclusive. For the following information we are indebted to the *Pharmaceutical Journal* and the *Chemist and Druggist*, in their issues of August 3d.

After the usual welcome by the city authorities, the address of the President, N. H. Martin, claimed the attention of the audience for some forty minutes. Because of President Martin's habit of saying something original, and without the usual sugar-coating, quite a large audience had assembled to hear his address, and they were not disappointed, for he succeeded in placing some truths before them in such a clean-cut manner that he drew out considerable enthusiastic applause.

The burden of the address was *pharmacy*, and the speaker handled it in a masterly manner. A few sentences from his remarks on the question of pharmacy being a trade or profession will show that he takes issue with those who are disposed to give up the professional idea.

At the present moment we are bound to acknowledge that true pharmacy in this country is in a most unsatisfactory condition. It is between a false assumption and pretence of science and the whirlwind of modern trade, and the practice of pharmacy as a separate calling is in danger of being lost altogether. By many of those who should be the leaders and defenders of pharmacy, the word "pharmaceutical" is often flouted and sneered at, and treated as an adjective, which no man in advance of the middle ages would dream for one moment of applying to anything scientific. Some of these men openly say that they do not know such a thing as "pharmaceutical" chemistry, and that there is no such thing as "materia medica," chemistry and botany having eviscerated that subject long ago. Such remarks are caught up by men who never in their lives spent a thoughtful hour in the pursuit of true science, and it comes to be considered the acme of wisdom to sneer at the science which is practical in the fulfillment of an essential duty. I believe pharmacy to be an entity which is

useful in a civilized state of society, the duties and landmarks of which are as capable of definition as medicine, biology, physiology and many other well-recognized divisions of knowledge. I am aware that it has no claim to stand alone as an abstract science, but must depend on botany and chemistry for the elucidation of many of its problems, but in this respect is it not on a par with the other divisions I have mentioned? Medicine, of course, is dependent on even a larger number of the various branches of science than pharmacy; but have biology or physiology any claims to be considered as abstract sciences? Are not their very names indicative of the want of knowledge of those who study them, and how dare any man say that a biological investigation is science, and worthy of all the honor which societies can bestow, while a pharmaceutical investigation must conceal its very name under some other title?

As to the whirlwind of modern trade, poor pharmacy is threatened and is in grave danger of being entirely overwhelmed by it. In my address last year I pointed to the fact that pharmacy was attempting the impossibility of posing as a profession while it practiced the baser methods of trade; and the answer from the headquarters of the craft, which can be read by all men in the altered features of the *Pharmaceutical Journal*, is that pharmacy is content to be a trade, and the Council of the Pharmaceutical Society the leaders of a trade Association."

The President then called attention to the fact that the formation of local associations had been recommended as a panacea for the ills of pharmacy, but he wished to point out the weakness of such a remedy.

The *duties of pharmacy* then claimed the speaker's attention; after the duty of dispensing, which should be assigned entirely to the pharmacist, there should be some time given to the Pharmacopœia and to research.

The scope of the Pharmacopœia "should be to provide the greatest number of the average medical men and pharmacists with accurate descriptions of all the drugs and preparations which are in reasonably common use at the time of its publication, so that they may judge of the identity and quality from the pharmacopœial description."

The error should be in having too many rather than too few formulas for stable and reliable preparations of drugs.

The omissions from the Pharmacopœia provide the happy hunting-ground for the cupidity of the empiric and the quack in pharmacy.

In regard to pharmaceutical research, it was declared "the duty which is incumbent upon every man to do something either to increase the aggregate amount, or to render more exact and scientific the knowledge which is in the possession of his calling, cannot be too seriously taken to heart by pharmacists."

The balance of the remarks on this topic and the conclusions will scarcely bear condensation, they had previously been well condensed by the speaker, and every sentence is worthy of the careful consideration of pharmacists in this country as well as in England.

The president having completed his address, the Executive Committee, the Treasurer and the Formulary Committee reported, which brought the Conference, in less than two hours, to the reading of original communications.

The first paper read was on

SANDAL WOOD OIL.

By E. J. PARRY.

In attempting to devise a quantitative method for the determination of the value of this oil, the author found that the best plan was to ascertain the amount of santalol it contains. Other alcoholic bodies present are expressed in terms of santalol. The alcohol is converted into an acetate, and the amount of acetic acid present in the acetylated oil determined, the result being expressed in terms of potash necessary to saponify the oil. Tables were given to

show the amount of potassium hydrate required to saponify five specimens of sandal wood oil, and the same after acetylation, as well as the specific gravities and iodine absorption numbers of the different samples. It was suggested that the results prove that the greater part of the aldehyd in the oil comes over in the earlier fractions, and that the saponifiable oil of highest boiling point increases in quantity as distillation proceeds, thus accounting for increase in specific gravity. The constitution does not appear to be materially altered by acetylation, and this process, followed by saponification with potassium hydrate, serves to detect the presence of cedar wood oil, the amount of which can also be approximately determined in a mixture of the oils.

NOTES OF A RESEARCH UPON IPECACUANHA.

BY R. A. CRIPPS.

The ether extract of the drug contained a trace of an alkaloid, oleic and palmitic (?) acids, neutral fat, wax and resin. The subsequent alcoholic extract was partly dissolved by chloroform whilst acid, and partly by ether and chloroform after being rendered alkaline by ammonia. The acid chloroform extract contained some alkaloid, but this requires further investigation. By fractional precipitation the whole of the alkaloid in the ether extract was separated, and two of the extreme fractions were converted into gold and platinum double salts, which proved to be practically identical in composition, the figures agreeing closely with those required by emetine (Paul). It was concluded that emetine was the only ether-soluble alkaloid. No definite results have yet been obtained with the alkaloid soluble in chloroform.

REPORT ON THE STRENGTH OF COMMERCIAL SAMPLES OF THE ALKALOIDAL TINCTURES OF THE BRITISH PHARMACOPŒIA.

BY E. H. FARR AND R. WRIGHT.

In their paper the authors reported the results of an inquiry into the strength and quality of commercial tinctures as dispensed by pharmacists. A very wide range in alkaloidal value was disclosed, some of the tinctures, even those of opium and cinchona, which are directed to be made of standardized drugs, being twice or three times the strength of others. The tinctures of *nuxvomica* never exceeded the official standard, but frequently fell below it, and those of *conium* were in most cases absolutely worthless, only one sample showing indications of having been made strictly according to the *Pharmacopœia* instructions.

COD LIVER OIL CONSTANTS.

BY E. J. PARRY AND C. E. SAGE.

The published constants of cod liver oil vary so considerably that the authors have thought the matter of sufficient importance to obtain a number of authentic specimens and determine some of their most useful analytical data.

The limits of specific gravity in the ten samples examined were '9227 to '9291; the saponification figures varied from 17'90 to 19'34 per cent. of potassium hydrate, and the iodine absorption figures from 153'5 to 168'4 per cent., confirming the results of Thompson and Ballantyne. The amount of free fatty acid, calculated as oleic, varied from 0'34 to 0'60 per cent.; their melting points from 21'5° to 25°, and their iodine absorption figures from 164'9 to 170'1. The mean molecular weights of the acids varied from 287'6 to 292'5.

THE OIL OF SCOTCH FIR, AND OTHER PINE OILS.

BY JOHN C. UMNEY.

The results of the investigation showed that (1) the rotation of true oil of Scotch fir (*Pinus Sylvestris*) may differ, either according to the period of the year at which the material for distillation has been collected, or to the conditions of climate and soil under which the fir has grown, although it should not exceed 20° in either direction in a 100 mm. tube; (2) that the specific gravity of the oil should not fall below .880 at 15° ; (3) that a very considerable portion should distil above 185° ; (4) that not more than 15 per cent. should distil below 170° .

The other pine oils examined were those from *Abies Canadensis*, *Abies excelsa*, *Picea vulgaris* and *Pinus pumilio*.

STERILIZED SURGICAL DRESSINGS.

BY EDMUND WHITE.

The author suggested that the sterilizer should be modified in such a way as to prevent the water which collects in the steam pipe from being blown into the apparatus when the steam is first turned on. A perforated plate should be placed over the orifice of the steam pipe where it enters the sterilizer, so as to secure the even distribution of the steam. The pressure in the sterilizer should not exceed 10 to 15 pounds per square inch, the steam being turned on slowly, after the dressings are placed in position, until the required pressure is attained. In conclusion, attention was called to a kind of cellulose wadding, made by the disintegration of pine wood, which had proved very satisfactory as an aseptic dressing.

THE WEIGHTS AND MEASURES OF THE BRITISH PHARMACOPŒIA VERSUS THE METRIC SYSTEM.

BY WILLIAM ELBORNE.

This paper was a summary of the often advanced arguments against the introduction of the metric system.

THE VOLUMETRIC SOLUTIONS OF THE BRITISH PHARMACOPŒIA.

BY WILLIAM ELBORNE.

It was pointed out by the author that the official volumetric solutions are, as a group, not entitled to the designation "standard solutions," inasmuch as the generally accepted nomenclature and standard of chemical equivalence are not uniformly adopted in their preparation.

REMARKS ON THE BRITISH PHARMACOPŒIA, WITH REFERENCE TO SECURING THE MORE GENERAL USE OF THE WORK AND RECOGNITION OF AN IMPERIAL CHARACTER.

BY CHARLES SYMES.

In extending the scope of the Pharmacopœia, it is necessary to bear in mind that the book is not only employed in all British possessions, but also in other places under British influence. In Africa, as far up country as Johannesburg, pharmacy is practiced much the same as at home, and the British Pharmacopœia is more used than any other. It is also used in Brazil, but not so much as the French Codex, the *Formulario e Guia Medica* of Chernoviz being used more than either of them, not merely because it is published in the Portuguese

language as there spoken, but on account of its containing some particulars concerning native drugs, therapeutical notes, and other matters of interest to the medical profession.

This raises the question of what the next British Pharmacopœia should comprise. Pharmacists should undoubtedly be appointed on the Pharmacopœia committee. Whilst the statement of proportions, according to the metric system, will be appreciated by many, it may also be found useful to give the equivalents of the doses in the same way.

A secondary list of new drugs still under trial, and of old ones becoming obsolete, might also prove an acquisition, and help to avoid too frequent changes in the body of the work.

RECOVERY OF ALCOHOL FROM TINCTURE MARCS.

BY F. C. J. BIRD.

The recovery of alcohol from drug residues has always been a tedious and somewhat expensive method. By the use of a water bath and a cone-shaped condenser, the author showed that he was able to recover all his alcohol by slowly heating it at 60° C.

SYRUP HYPOPHOS. COMP. B.P.C.

BY W. A. H. NAYLOR.

The odor of sulphuretted hydrogen was stated by Bird, at the Conference last year, to be due to the action of free hypophosphorous acid on sulphates. In the present paper, however, it was considered to be due to the acid on sulphites. The results of the examination of a number of samples of the commercial syrup showed that phosphites were present in all but one. When made with commercially pure materials, the syrup can be stored in bulk in glassware, for three or four weeks, without undergoing change. To prolong the period during which it will remain bright, it was recommended that 80 grains of potassium citrate be added to each pint.

NOTE ON A SPURIOUS SAMPLE OF TOLU BALSAM.

BY J. OLDHAM BRAITHWAITE.

This sample differed from genuine balsam of tolu in its behavior with carbon disulphide, and the saponification equivalent of the insoluble residue was found to be very low, approaching that of copaiba resin. It was suggested that the following addition might, with advantage, be made to the characters and tests of tolu balsam in the Pharmacopœia: "When 5 parts are gently warmed with two successive portions of 25 and 10 parts, respectively, of carbon disulphide, and the solvent decanted into a tared flask, the residue on distillation should be distinctly crystalline, and every 1,000 parts of this residue should require for its saponification not less than 300 parts of potassium hydrate."

THE QUALITY OF COMMERCIAL POWDER OF IPECACUANHA.

BY HENRY G. GREENISH.

In a paper read at an evening meeting of the Pharmaceutical Society, in February last, Professor Greenish showed how ipecacuanha root and stem may be distinguished in the state of powder, and also how Brazilian and Carthagena ipecacuanha may be distinguished in the same condition. It became manifest, therefore, that the ordinary processes of assay might be usefully supplemented

by a microscopical examination of the powdered drug. A chemical assay alone is insufficient, for, as pointed out, it is not enough to know that a powdered ipecacuanha contains 2 or 2.5 per cent. of alkaloid capable of being extracted by a particular method, and yielding the emetine reaction. Sawdust mixed with the alkaloid obtained in de-emetinising ipecacuanha might then be regarded as complying with the requirements to be demanded of a good sample.

The two assumptions commonly made when powdered ipecacuanha is valued by the result of the assay—first, that the alkaloid extracted consists of nothing but the alkaloid pre-existent in the drug; secondly, that such alkaloid is the sole active principle in the drug and alone regulates its physiological effect—may be either or both incorrect. The liability to error is much diminished if the freedom of the powdered drug from foreign admixture is previously determined by the microscope, but before such an examination of a powdered drug can be undertaken with any prospect of obtaining reliable results, the pharmacist must familiarize himself with the structure of the genuine drug.

A minute examination of a number of different commercial samples of the genuine drug having been made by the author, he next obtained thirty-two samples of the commercial powdered drug from pharmacists in London and the provinces, and carefully examined them, with a view of ascertaining whether they consisted of genuine ipecacuanha, also from what commercial variety they had been prepared, and the commercial quality of the drug that had been used, particular attention being directed to the presence of stem and of an undue proportion of wood. The results were embodied in a table which shows that none of the samples were adulterated with foreign starch or with foreign drugs. Twelve samples proved to be powdered Carthagena ipecacuanha, and amongst the twenty classed as Brazilian some few may have been in reality Carthagena, while amongst those classed as Carthagena, some may be mixtures of Carthagena with Brazilian. Only one sample could claim to be regarded as a powder of really good Brazilian root free from stem, and it was asserted that much of the powdered ipecacuanha sold by pharmacists contains an undue proportion of stems. Though free from gross adulteration, therefore, the powdered ipecacuanha of English commerce appears to be comparatively rarely prepared from high grades of Brazilian root.

A STILL ALARM.

BY N. CROSSLEY JONES AND P. W. JONES.

This consisted of a float to be attached to a receiver, so that when the liquid in the receiver reached a certain height, the float rising would move a lever with which it is connected and complete an electric circuit.

ACETIC EXTRACT OF IPECACUANHA.

BY F. C. J. BIRD.

This was a record of experiments made with the view of reducing the great alkaloidal loss entailed by the Pharmacopœia method of making wine of ipecac. Paul and Cownley have demonstrated that both emetine and cephaelene are affected when their acetic solutions are evaporated to dryness and exposed to the temperature of the water bath for any length of time. Bird proposes a triple method of extraction; first, percolation with alcohol, then with acetic acid, and, finally, with diluted acetic acid; evaporating the menstruum and drying the extracts separately, then mixing.

The loss of alkaloid in the official method is 26·8 per cent., but by this process it is reduced to 8·7 per cent.

TINCTURE OF LOBELIA.

BY J. F. LIVERSEEGE.

In the British Pharmacopœia it is stated that lobelia should be reduced to No. 40 powder for preparing the tincture, but the author found that only about 40 per cent. could be made to pass through a No. 40 sieve, working on the small scale, and with a pestle and mortar. In view, therefore, of the fact that pharmacists might be in doubt whether, under the circumstances, they should use the specified quantity of the drug powdered as finely as possible, or take a larger quantity and make up the full weight from the powder that passes through the sieve, he investigated the point whether the latter would yield stronger tincture or not. As a result of experiments, it was found that a tincture prepared from the fine powder contained rather more than one and a half times as much extractive and alkaloid as one prepared from the stalks left on the sieve. It was suggested, therefore, that the official instructions should be so far modified as to permit of the tincture being prepared by pharmacists, on the small scale, with ordinary appliances. The same suggestion was also applied to the formulæ of the other B. P. tinctures.

GLYCERIN TINCTURE OF CINCHONA.

BY FREDERICK DAVIS.

The purport of this paper was merely to show by experimental data that a better tincture of cinchona may be prepared by using glycerin with alcohol for the exhaustion of the bark than by employing alcohol alone.

The reading of papers having been disposed of, after occupying nearly four sessions, the question of next year's meeting was brought up, and it was decided that the Conference should meet at Liverpool in 1896. The following officers were then elected :

President, William Martindale; Vice-presidents, Michael Carteighe, J. Laidlaw Ewing, W. Hayes and M. Conroy; Treasurer, John Moss; Honorary General Secretaries, W. A. H. Naylor and F. Ransom; Honorary Local Secretary, T. H. Wardleworth; Executive Committee, F. C. J. Bird, E. H. Farr, E. M. Holmes, Stewart Hardwick, W. F. Wells, Edmund White, R. Wright, George Coull and J. Smith.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The forty-third annual meeting of the American Pharmaceutical Association was held in Denver, Col., from Wednesday, August 14th, to Wednesday, August 21, 1895.

On Tuesday, August 13th, members of the organization and their accompanying friends began to arrive in Denver from all parts of the United States, with the exception of the Pacific Coast; this section being poorly represented, probably because of the inability of the Transportation Committee to secure a reduction in railroad rates.

En route to their destination, the several parties of delegates, which traveled mostly by special train, were tendered entertainments by the pharmacists of the cities through which the route lay. Notable among the special attentions

which were lavished upon the travelers was the St. Louis welcome. In this city the delegates from the East arrived at 7.15 A.M., on Sunday, August 11th, and from that hour until late in the evening of the same day, the resident pharmacists displayed a hospitality of the true Western stamp. The committee escorted their guests to the Planter's Hotel, where an informal reception was given them, from 9.30 to 10.30 A.M. At the close of the latter entertainment, the party was conducted to the plant of the Anheuser-Busch Brewing Association, where they were permitted to inspect the machinery and apparatus employed in the production of malt beverages. From the brewery the visitors returned to their hotels, and, after a midday repast, were driven in carriages across the famous St. Louis bridge, from which a magnificent view of the Mississippi River was obtained. Returning to the Missouri side, the procession passed through the main thoroughfares of the city, as also through some of the quiet and beautifully cultivated private streets, and through some of the smaller parks to the destination of the drive, the Cottage in Forest Park. At the latter place a lunch was served and the speech-making of the day inaugurated—Adolph Braun representing the St. Louis committee and Prof. J. P. Remington replying for the delegation.

At Jefferson City and also at Kansas City the delegation was cared for by the local pharmacists. A floral design of the mortar and pestle was presented to them at the first place, and at the last-named place the party was tendered a cable car ride over the hills of the city.

Besides these given entertainments, which were participated in by the Eastern and Southern delegations, other evidences of welcome were shown by the pharmacists of Lawrence, Topeka, Emporia, Newton and Hutchinson—towns through which the Chicago delegation passed.

The several special trains were met by members of the Denver local committee of arrangements, who were enabled to instruct the travellers regarding hotels, sight-seeing and other matters of general interest and concern.

The Association had its headquarters at the Brown Palace Hotel, in the ordinary of which structure all of the business meetings were conducted.

FIRST GENERAL SESSION.

The first general session of the Association convened on Wednesday, August 14th, at 3.30 P. M. The meeting was called to order by First Vice-President C. M. Ford, who, after speaking of the good attendance, introduced Governor McIntire, of Colorado. The Governor extended the hospitality of the State, and referred to the importance of the business that the Association had met to transact. The Mayor of Denver, Mr. McMurray, was next introduced by Vice-president Ford. A hearty welcome to the city was given the members by its executive. President Simpson then introduced Second Vice-president J. N. Hurty, who replied to the courtesies of the previous speakers.

Vice-President Hurty then took the chair, while the President, William Simpson, of Raleigh, N. C., read his annual address. He referred to the small number of graduates, as compared to the large number of pharmacists, advised more education and training, and suggested that the Association recommend the standard of education necessary for entrance to the ranks to be made the same as that required for entrance into high schools; and that each State Board of Pharmacy be informed of the Association's attitude in this matter. With

such a regulation in force, the President expressed himself to be of the opinion that the State examinations, through their test of the technical qualifications of candidates, would be enabled to exclude the incompetent. The address was referred to a committee of three, consisting of Messrs. Alexander, Remington and Alpers. The minutes of the meeting which was held last year at Asheville, N. C., were read and approved. The report of the Council, which had held its first session at 9.30 in the forenoon, took the same course. The reports of numerous committees were read by title, and, without particular comment in most cases, were accepted. The Permanent Secretary, Prof. Caspari, reported having received the credentials of delegates from twenty-six state associations, eleven colleges of pharmacy, four alumni associations, three schools of pharmacy connected with universities, and five county pharmaceutical associations. Secretary of Committee on Membership, Kennedy, read his report, which embodied a suggestion to rent a deposit-box in Washington, D. C., and also a suggestion to stamp the volume of Proceedings with the official seal of the organization. He reported the application of 214 new members, and these were invited to complete their membership by paying the fee and signing the constitution. The applicants were from almost every section of the United States.

A recess of five minutes was then granted, that the members might select their representatives for the nominating committee. When the Permanent Secretary called the roll of States at the end of this intermission the following responded: Alabama, Arkansas, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Carolina, Texas, Virginia, District of Columbia and the province of Quebec. The Nominating Committee decided to meet immediately after the session adjourned. In addition to the nominators from the states, the President appointed at large, Messrs. Ebert, Remington, Gordon, Alexander and Hurty. It was moved and carried that the reading of the reports of the permanent Secretary and Treasurer be deferred until the second general session.

Just what to do with the names of delinquent members in the Proceedings was a subject of considerable discussion and confliction of ideas for some time. The matter was, however, finally referred to Council.

The Permanent Secretary read invitations from pharmaceutical and business organizations in Montreal, Canada; Hot Springs, Ark., and the Twin Cities—Minneapolis and St. Paul, Minn. All of these places were anxious to have a visit from the Association next year. The president appointed Messrs. Frost, Morrison, Thompson, Watson and Legendre a committee on time and place of next meeting. The invitations were referred to this committee.

On motion the session adjourned until 10 o'clock the following day.

At 9 P.M. on Wednesday, August 14th, a general reception was tendered the members of the Association and their families by the Colorado Pharmacal Association in the parlors of the Brown Palace Hotel. President Arcularius, of the State organization, welcomed the guests, and was answered by Prof. J. M. Good on the behalf of the American Association.

SECOND GENERAL SESSION.

Thursday, August 15th.—After the meeting had been called to order, the minutes of the preceding day were read and approved. The report of the Per-

manent Secretary was also read and referred to the Publication Committee. The Permanent Secretary stated that the library of the Association was not a valuable one, that a large number of the serial publications which it contained were not near enough complete to be especially useful, and that a great part of the library, consisting of pamphlets and similar books, was really not worth the storage that the Association would in time have to spend on it. It was moved and carried that the Association donate such books, pamphlets, circulars, etc., as were deemed unneeded by it to the library of Messrs. Lloyd Bros., of Cincinnati. For this donation Prof. J. U. Lloyd thanked the meeting in the name of every pharmacist that is yet to come, stating that the library is to be devised to some educational institution. The Permanent Secretary thought that the number of back volumes of Proceedings that the Association now had, might, with propriety, be reduced. Prof. Hallberg moved that the price of back numbers be reduced still more, stating at the same time that he would like to complete his set, and that he thought the members should be permitted to do so before other disposition was made of the volumes. It was evident from the interest displayed that many held Prof. Hallberg's views, and, like him, wished to avail themselves of an opportunity to add to their libraries.

It was suggested that a price list be published in the various pharmaceutical journals in order that members and others might be instructed in the matter. The Publication Committee was ordered to look after the affair.

The Treasurer, in his report, showed the finances to be about the same as last year, at which time they were sound. The Finance Committee advised the regulation of expense in a suggestion that papers should not be printed until passed on. Their reports and suggestions were turned over to the Publication Committee, as was also the report of the Treasurer.

Secretary Kennedy stated that the names of 109 members would be dropped from the list unless their fees were paid by the time of the next publication of the Proceedings. Seventeen new members were added to the 214 previously reported, thus making 231 new members for the Denver meeting, and a total of 1,661. Mr. Kennedy recommended that the names of life and active members be published in separate lists in the Proceedings. The report was referred for publication. The Committee on President's Address moved its adoption, and referred it to the Publication Committee. The Nominating Committee reported the candidates for the respective offices during the ensuing year. The Permanent Secretary was requested to cast a ballot. The ballot was affirmative and the following candidates declared elected :

President, J. M. Good, St. Louis, Mo.; First Vice-President, C. E. Dohme, Baltimore, Md.; Second Vice-President, A. Brandenberger, Jefferson City, Mo.; Third Vice-President, Mrs. M. O. Miner, Hiawatha, Kan.; Treasurer, S. A. D. Sheppard, Boston, Mass.; Permanent Secretary, Chas. Caspari, Jr., Baltimore, Md.; Reporter on the Progress of Pharmacy, C. Lewis Diehl, Louisville, Ky.

The following were elected members of Council for three years:—G. L. Heckler, C. M. Ford and W. J. M. Gordon. J. Burgheim, of Texas, was elected to fill the unexpired term of C. Lewis Diehl, who was transferred to the reportership.

The Committee on General Prizes reported the awards as follows: First prize, to Henry Kraemer, for his microscopical and chemical examination of cloves; second prize, to A. R. L. Dohme, for his additional experiments with stramo-

nium, and his contribution on the relative alkaloidal value of two kinds of ipecac root; third prize, to L. F. Kebler, for his paper entitled "Analytical Alkaloidal Chemistry." The committee on the Ebert prize reported that none of the papers submitted had been found eligible. The reports of the Committees on Prizes were referred to the Publication Committee.

Chairman Eliel then reported for the Committee on the Revision of the United States Pharmacopœia, which endorsed the suggestion to introduce maximum-doses into the Pharmacopœia.

The sale of 13,944 copies of the Pharmacopœia, from its issue until the time the report was written, was reported. Deducting what has been sold abroad and to physicians, the sales would show that but about 25 per cent. of the pharmacists of this country have it in their possession. The committee recommended the introduction of popular and widely used preparations with working formulas, that the Pharmacopœia may be made more popular with all classes of pharmacists. Prof. Remington moved that the report be referred to the scientific section in order that its items might be given some discussion. The motion was carried.

Prof. Sayre moved that the thanks of the Association be voted Henry Kraemer for his efficient work as Reporter on Progress of Pharmacy. The motion was carried.

The committee on time and place of next meeting reported in favor of Montreal and fixed the date as August 12, 1896. J. E. Morrison, of Montreal, Canada, was chosen local secretary.

The committee on National Formulary presented their report through their chairman, Prof. Diehl, and advised a new edition, at the same time submitting the manuscript for the publication. The chairman stated that the calls which the committee had made upon some of the manufacturers for formulas were often replied to in vague terms, hence the inability of the committee to insert certain widely used preparations. The quantities which the formulas given in the Formulary were to make, had, in some cases, been lessened—experience indicating the uselessness of ordering large quantities. Acacia was recommended as the best emulsifier for prescription work, but for manufacturing purposes the other emulsifying agents given in the Formulary could be employed. A class of granular effervescent powders was proposed. The report was referred for publication. Prof. Whelpley moved that the revised edition of the National Formulary be published in the volume of the proceedings for 1895, and not separately. This was objected to by a number of those present, and after much discussion the whole matter was transferred to the Council with power to decide the manner of publication and distribution of the Formulary. It was thought that \$1 should be the minimum retail price for a separately bound copy of the work. The Council was also granted the privilege of permitting the publication of smaller editions or of epitomes of the Formulary. This grant arose from an opinion held by many present that the work would be made better known among physicians if pharmacists would supply them with pocket editions. The following was presented:

Resolved, That the Committee on National Formulary be instructed to publish formulas of popular proprietary medicines, and provide names under which all pharmacists may manufacture and sell them.

Resolved, That the fanciful or trade names or synonyms be inserted as

proper names or synonyms in all cases where said preparations are not already provided with proper names by the manufacturer who introduces them.

Prof. Hallberg's report on the revision of the Constitution and By-Laws was, upon motion, referred to Council, to be taken up at a later session.

SECTION ON COMMERCIAL INTERESTS.

Chairman Seabury called the Section to order on Thursday, August 15th, at 3.30 P.M. He then read a letter from Mr. J. O. Burge, secretary of the Section, in which the latter gentleman expressed regrets for his absence. Clay W. Holmes was then asked to act as secretary *pro tempore*. The minutes of last year's session of the Section were read and approved. The chairman then delivered his address, which was entitled "*The Analysis of Our Past and Present Professional and Mercantile Complications.*" In this address the speaker favored the "Tripartite" plan when the relations of the manufacturer, jobber and retailer were under consideration. He recommended free alcohol for use in exported products, a factor which he said would put our industries on an equal footing with foreign competitors. The speaker called attention to the low wages usually paid drug clerks. The Universal Trade Association was given some not very favorable notice. The remedy for the present troubles, according to the chairman's idea, was to be had through the thorough organization of druggists into local, county, city, state and national associations. He recommended that a committee of nine active members be appointed to consider the present situation, the matter of sophistication, substitution and other pertinent subjects. Messrs. Hurty, Alexander, Patton, Holmes, Chalin, Quandt, Wooten, Heckler and Schuh were assigned to this special conference committee.

A national committee on trade interests and local organization was also suggested by the chairman. It was to be composed of three members of the American Pharmaceutical Association, these to be appointed by the President of the Association from among the members of the Commercial Section, and associated with these the chairman on Trade Interests of each State Association and the Associations of Canada. The Special Conference Committee, as also the National Committee, were recommended to report annually to the American Pharmaceutical Association through the Section on Commercial Interests.

The afternoon session of the Section on Commercial Interests having afforded insufficient time to complete the transaction of the business of the Section, a special session was held at 9 P.M., the Scientific Section, which was programmed to meet, granting the privilege of the evening. Chairman Seabury called the meeting to order, after which Secretary Holmes read the minutes of the afternoon session. The chairman's address was approved, and the resolutions connected with it were referred to the Executive Committee on Commercial Interests. In a paper entitled "*The Patent Medicine Evil*," R. N. Girling discussed methods of regulating the sale of patent medicines, and the means of reducing the evil. In answer to a subject upon which the chairman of the Section of Commercial Interests wanted information, F. E. Stewart and Joseph Helfman presented papers on "*Non-secret Medicines.*" Clay W. Holmes read a paper on "*A Final Remedy for the Patent Medicine Evil.*" On motion the meeting adjourned.

On Friday, August 16th, at 8.30 A.M., three special trains left the Union Depot at Denver to take the members and friends of the Association on a trip up Clear Creek Cañon, over the famous Loop, to Silver Plume. Here the well-known Mendota Mine was visited, and the process of mining witnessed. The thoroughly delighted party then returned to Denver, arriving in that city about 7 P.M.

SECTION ON SCIENTIFIC INTERESTS.

The first session of this section was held on Saturday, August 17th, at 10 A.M. Prof. Remington presided in the place of President Simpson during the preliminary session of the Association proper, which is usually held as an introduction to the meeting of the section. At this meeting of the main body the minutes of the seventh session of the Council were read and approved. Chairman Dohme, of the section, then read his address, Prof. Good having been asked to occupy the chair during the reading. The speaker reviewed the history of chemistry from the latter part of the past century. He referred in particular to the progress that had been made in plant chemistry and the synthesis of organic compounds. Mention was also made of the discovery of argon and the terrestrial source of helium. The chairman expressed himself as pleased with the present outlook. He suggested that a committee of three, consisting of the Permanent Secretary, the chairman of the Section on Scientific Interests and the chairman of the Committee on Revision of the United States Pharmacopœia, be appointed to call upon members for research work; and that the expense of such work be paid out of the funds of the Association, the amount being subject to proper regulations. The address was referred to a committee of three for consideration of the suggestions. Chas. Caspari, Jr., of the Committee on the Use of Indicators Employed in the Titration of Alkaloids, which was outlined by Prof. Sayre at last year's meeting, reported the extensive work which the committee had performed. The committee had been assisted by Profs. Prescott and Lloyd. It suggested the use of hydrochloric acid as preferable to that of sulphuric for the titration of quinine, for the reason that the fluorescence was, to a large extent, circumvented. Hæmatoxylin was decided to be the best indicator for use in standardizing the acid and alkaline solutions, brazil-wood was recommended for use in the case of quinine, while for the titration of morphine, brazil-wood, cochineal and methyl-orange were all found to be serviceable. The opinion of the committee was to the effect that cochineal was the best general indicator for alkaloidal titrations. The report also gave certain instructions regarding the proper amount of indicator to be used, and in this connection mentioned the initial and final colors that should be obtained. The work is not yet done, but the tabulated results which accompanied the report indicated that the subject was being very thoroughly studied. The report was accepted with the thanks of the Association, and a motion carried to send a copy of it to the Revision Committee of the United States Pharmacopœia. Another motion to reimburse the members of the committee for the materials used in the work received the approval of the Association. Nominations for the officers for next year being in order, Messrs. Prescott, Dohme and Sadtler were named for chairman of the section. The first two gentlemen, however, withdrew their names, after which the nominations were closed until the afternoon session. Messrs. Alpers and Eliel were thereafter nominated for the secretaryship of the section, and nominations for this office were closed until the next session.

EXAMINATION OF ELM BARK, FLAXSEED AND MUSTARD FOR STARCH.

By J. U. LLOYD.

Prof. Lloyd next presented a paper which described work on elm bark, flaxseed and mustard with the aim of examining them for starch. This paper is printed in full on page 459 of this issue. Prof. Lloyd remarked on the decided power of the mucilage of elm bark to decolorize the iodine and starch compound. He had found that sulphuric acid would temporarily restore the color. He was not certain that this behavior was altogether due to the calcium compounds present; there seemed to him to be other things present in the bark which might partly account for the difficulty experienced in the detection of the starch whose presence he established in elm bark. Prof. Prescott spoke of the transient colors obtained by the action of iodine on the dextrins and similar compounds more closely related to starch. He thought the action of the sulphuric acid on the thick-walled granules of the starch-containing materials might affect these substances sufficiently to afford an evanescent color with iodine. Prof. Lloyd had, however, used the sulphuric acid only in quantities sufficient to prevent the production of an alkaline condition, therefore he believed that no such discrepancy as that mentioned by Prof. Prescott had been introduced. Mr. Ebert was of the opinion that traces of starch might be found in some powdered drugs, whereas it did not exist in the original state, from the fact that imperfect cleaning of mills might furnish enough starch to respond to the delicate iodine test. He thought a limit to such accidental contamination should be adjusted. Prof. C. S. N. Hallberg then read in abstract a paper on

THE EXAMINATION OF STARCH IN POWDERED ELM BARK.

By W. B. DAY.

The author had employed a method somewhat similar to that used by Henry Kraemer in his examination of cloves, a paper presented at the Asheville meeting last year. He detected wheat starch, and from this adulteration inferred that it had been introduced in the form of flour. He found the granule of elm bark starch to be smaller than that of wheat starch. He computed the extent of the adulterant by assuming the amount of wheat starch present to represent 70 per cent. of the quantity of flour used in the admixture. In order to count the granules, the material under examination was suspended in syrup. Both papers were accepted and referred to the Publication Committee. Prof. Whelpley directed the attention of the section to the interest that was being displayed in the matter of detecting adulteration, while Prof. Sayre emphasized Mr. Ebert's suggestion to properly regulate the amount of accidental impurities which should be permitted to be present.

TARAXACUM ROOT AND TARAXACIN.

By L. E. SAYRE.

It was intended to supplement some previous contributions on the same subjects, and is printed in full on page 465 of this number.

WHAT IS THE PURE ACONITINE OF COMMERCE?

By A. R. L. DOHME.

This investigator had examined all of the available makes of the American market. From his observations of color and consistency, experiments with

the melting points, titrations of the samples with decinormal sulphuric acid volumetric solution, and estimations of benzoic acid yielded upon saponification, the author concluded that none of the samples were pure, but were to a greater or less extent mixed with apo-aconitine and pseudo-aconitine. No two of the samples were found to be the same. He urged the necessity of having a definite product so that a physician could know what he was ordering and what effects to expect.

Professor Prescott thought that, in view of the unstable character of the alkaloids of aconite root, a concentrated preparation was probably the best form for use. He believed it would be difficult to keep the alkaloids in the free state, unless, perhaps, with the aid of a preservative. He was in favor of Squibb's method of assay by application to lips as the best known method.

The work of our foreign brethren, who have lately been investigating aconite alkaloids, came in for a share of attention in the discussion which followed the reading of the paper.

THE DIGESTIVE POWER OF PEPSIN.

BY C. C. SHERRARD.

The effect of the amounts of water and hydrochloric acid given in the official assay of pepsin was considered in detail. Chairman Dohme thought it would be well to have the attention of the Revision Committee of the U. S. Pharmacopœia called to the results of this investigation.

STRUCTURE OF OUR CHERRY BARKS.

BY EDSON S. BASTIN.

An exhaustive study of the microscopical structure of our cherry barks was the subject of the next contribution. This paper is published in full on page 435 of this issue. Prof. Whelpley considered that the association owed Prof. Bastin many thanks for the means of so easily distinguishing the barks of the different species. The same speaker remarked that the Pharmacopœia directed only those barks known to be useful. He suggested that some one make determinations of the relative medicinal value of the barks of the unofficial species.

ASSAY OF WILD CHERRY BARK.

BY A. B. SIEVENS AND J. N. JUDY.

In order to answer query number 1, "Is the thin, green wild cherry bark really more valuable therapeutically than the older and thicker bark?" the authors made comparative assays on carefully selected samples of each variety. The results furnished to the query a negative answer.

The method of estimation was based upon the conversion of the glucoside amygdalin into hydrocyanic acid and a volatile oil when the bark was macerated with water; second, upon the distillation of the hydrocyanic acid to separate it from the bark; and third, upon the estimation of the hydrocyanic acid, both volumetrically by titration with potassium hydrate solution and gravimetrically by conversion into the silver compound. The thick bark showed from '32 per cent. to '35 per cent., the thin bark from '24 per cent. to '27 per cent. of hydrocyanic acid. These amounts are much higher than have been reported. The authors established the fact that the methods of estimation formerly employed were very defective. Messrs. Stevens and Judy added water, and continued the distillation until no more hydrocyanic acid

could be obtained. A line of experiments which these gentlemen instituted showed that all but one per cent. of the whole amount of hydrocyanic acid present could be obtained by the method of estimation which they used. The glucoside existing in the barks was estimated by extracting the bark with absolute alcohol, evaporating the alcoholic extract to syrupy consistence, after which the glucoside was precipitated by the addition of ether. The impure glucoside obtained in this manner was freed from resin by dissolving it in water. The residue that was obtained when this water solution was evaporated to dryness was considered as glucoside. The yield of this substance from the thick bark equalled 4.12 per cent., and from the thin bark 3.16 per cent. Mr. Ebert mentioned that this paper was of practical value from the fact that the thin bark had always commanded a higher price than the thick, yet at the same time it was not near so good as the latter. The papers were referred to the Publication Committee. On motion, the section adjourned until 3.30 P.M. At this hour the second session convened.

After the reading of the minutes of the morning session, the Committee on Chairman's Address, consisting of Messrs. Sayre, Prescott and Diehl, reported favorably, and suggested that a sub-committee, to be known as a Special Research Committee, be appointed by the present incumbent of the chair. The committee was to consist of three members of the Association, and the Chairman of the Section on Scientific Interests and of the Committee on the Revision of the United States Pharmacopœia, *ex-officio*. They were to have charge of any special investigation which in their discretion was within the province of the section on scientific interests. It was recommended that this committee shall receive such encouragement, financially, as is necessary to advance its work. The suggestion was adopted, but made subject to the approval of the Council. Prof. Samuel P. Sadtler, of Philadelphia, was unanimously elected chairman of the section for next year. A ballot for secretary then took place. W. C. Alpers received a majority of votes. A committee, which had been appointed to revise the business of the section, proposed that in order to facilitate the procedure of business, a general rule be enacted which would limit the time allowed for the reading of a paper to fifteen minutes. Discussion was to be unlimited, provided it had bearing on the subject. The papers of authors who were present were to be given preference. These rules were to be subject to the vote of the section, by which means the time allowed for reading could be lengthened. In order to encourage discussion, it was ordered that the printed papers be distributed on the day of the first general session, and that a bulletin of them, stating the title and the time when they would likely be read, be posted in the proper places. The report of the Committee on the Revision of the United States Pharmacopœia was then read by Chairman Eliel, in order that there might be discussion regarding the suggestion which it contained. The committee recommended that granulated opium be used in the preparation of the tincture and the deodorized tincture, and that the use of precipitated calcium phosphate be omitted in their preparation. Professor Remington supported the use of the calcium compound, and referred to the difficulty of obtaining granulated opium as the objection to its use. Professor Hallberg was decidedly in favor of granulated opium and the dropping of the precipitated phosphate. Professor Caspari had obtained best results with No. 40 granulated opium, and had found the official method unsatisfactory.

Professor Sayre thought the presence of ammonium chloride or other salts in the precipitated calcium phosphate exercised an ill effect. The committee recommended that such of the aquæ medicatæ as are now directed to be made by trituration with precipitated calcium phosphate be made either by agitation of the oils with hot water and subsequent filtration, or by the use of a double filter, the inner one a size smaller than the outer and evenly saturated with the oil and the outer one wetted. Professor Hallberg objected to the use of precipitated calcium phosphate on account of the soluble salts which were likely to be present. He strongly recommended the hot water method, and was corroborated in his views by Mr. Alpers. The committee desired that experiments be made on the use of dextrin syrup or glucose in place of glycerin in the preparation of fluid extracts containing resinous matter. It was also recommended that experiments be made with acetic acid in the manufacture of these preparations and tinctures, to replace, in part, at least, the alcohol now directed. The chairman of the committee stated that numerous complaints had been made to the effect that soap liniment became solid at the ordinary temperature of the room. The committee suggested that this matter be investigated and assigned as the cause of the trouble either an impurity in the soap or that the Pharmacopœia had directed too large a quantity. Professor Hallberg stated that the presence of much stearate in the soap would tend toward such a condition. Professor Remington said that this trouble usually arose from inattention to the amount of moisture present in the soap, and recommended the use of the shavings that are obtained when the bars of soap are cut into cakes for sale. The committee thought the melting point should be stated for aloin, and that the solubility should be changed. They called attention to the incorrectness of the chemical formula, $K_6Fe(CN)_{12}$, for potassium ferricyanide, as stated on pages 477 and 520. On page 360, under sodium hypophosphite, in the second line of the second paragraph, mercuric chloride should be read instead of ammonium chloride.

The committee thought the term isonitril, which is used in describing the tests for acetanilid, should be superseded by the term phenilisocyanide, for the reason that the former term is meaningless. They desired to limit the use of the termination *ol* to phenols and alcohols, prohibiting its use as applied to aromatic hydrocarbons, which have a generally applied English name. To illustrate their suggestion, they stated that what is now called benzol and toluol should be known respectively only as benzene and toluene. They considered that the names hydrochlorate and hydrobromate, as applied to salts of hydrochloric and hydrobromic acids, are incorrect; that these should be changed to hydrochloride and hydrobromide. They thought that the name chloral as a heading for something that is not chloral, but chloral hydrate, is an error, and that the full name should be stated. The melting point of atropine should be 115° instead of 108° C. The committee thought a distinction should be made between *Erythroxyton Bolivianum* (Huanco leaves) and *Erythroxyton Spruceanum* (Truxillo leaves) as there is a microscopic difference in the leaves and a decided difference in the yield of alkaloid. The adoption of standards of strength and methods of assay were recommended for coca leaves, belladonna leaves and root, and henbane leaves. In the opinion of the committee, stramonium seed should be superseded by the leaves and stems for the following reasons, viz.: because the leaves and stems contain more alkaloid,

because the oil present in the seed renders the preparations of them immiscible with other preparations, and because the seed require a stronger alcoholic menstruum than do the stems and leaves. It was advised that strophanthus and colchicum seed be deprived of oil before being used for the making of preparations. The definite chemical compound of gold and sodium chloride, $\text{AuCl}_3\text{NaCl} \cdot 2\text{H}_2\text{O}$, was offered to replace the mixture of the two chlorides which is now official. It was suggested to have the English name, of which tartar emetic is the synonym, read potassium and antimonyl tartrate instead of potassium and antimony tartrate. Attention was directed to the fact that the official carbonates of magnesium, lead and zinc are of basic character, and should be so qualified in name. Hydrastis should be required to contain a certain strength of white alkaloid. Hydrastine hydrochloride should be official. The committee offered the following additions to the directions for the assay of powdered opium: insert after the words "another portion of 10 c.c. of ether," the words "let the ether on the filter and crystals evaporate completely," and after the words "more than about 10 c.c. in all," insert the words "use a feather to remove the crystals that adhere to the flask." A distinction should be made between *Pilocarpus pennatifolius* and *Pilocarpus microphyllus*. A method of assay should be devised and a standard strength of pilocarpine fixed. The committee had found the official formula for the preparation of the solution of magnesium citrate unsatisfactory. They then submitted a formula which had been proposed by A. B. Stevens and W. Palmer at a meeting of the Michigan Pharmaceutical Association. It was as follows:

Magnesium carbonate	13'0	grammes.
Citric acid	26'5	"
Oil of lemon	0'128	"
Sugar	62'0	"
Potassium bicarbonate	2'0	"
Water, a sufficient quantity.		

Dissolve the citric acid in 250 c.c. of water, and add to this solution the magnesium carbonate which has been previously triturated with the oil. In the solution which results, dissolve the sugar. When this has dissolved, filter into an appropriate bottle having a capacity of 360 c.c. Then add enough water to nearly fill the bottle, drop in the potassium bicarbonate, immediately close the bottle with a cork, and secure the latter with twine. In connection with this subject, Professor Hallberg spoke of a formula which directed the sterilization by heat of the solution of the magnesium salt after it had been filtered into the bottles. After this treatment the bottles were stoppered and set aside until the finished article was called for, when the addition of potassium bicarbonate was made in the usual way. Professor Caspari mentioned the tendency of the solution of magnesium citrate to deposit the normal salt, and the necessity of employing sufficient citric acid to insure the formation of the more soluble acid citrate, or at least to prevent the separation of the normal citrate. Chairman Eliel, of the Reporting Committee, said that he was accustomed to rub a soluble essence of lemon, instead of the oil, with the magnesium carbonate. The report of the committee also contained the following formula for Sapo Mollis:

Olive oil	1,000	grammes.
Potassium hydrate	360	"
Water	3,000	cubic centimetres.

Dissolve 300 grammes of the potassium hydrate in 2,000 c.c. of water, and add 500 c.c. of this solution to the oil in a suitable vessel; place over a moderate fire, stirring until the mixture has thickened sufficiently. Gradually add the remaining solution, and continue the heat, stirring occasionally until the mixture assumes a transparent gelatinous form. Dissolve the remaining 60 grammes of potassium hydrate in 1,000 c.c. of water, add this to the mass, and evaporate to the proper consistency. Mr. Eliel had found this to afford a very good product, and desired that this formula replace the one now official, as the product of it is entirely unsatisfactory. He submitted a sample of his product. It was destitute of the objectionable odor usually noted in this preparation.

The report of the committee was accepted and a copy of it ordered to be sent to the Committee on Revision of the U. S. Pharmacopœia.

NOTES UPON SOME PHILIPPINE ISLAND DRUGS UNDER ANALYSIS FOR ALKALOIDS, ETC.

BY A. B. PRESCOTT.

The notes were taken from the laboratory work of Elgin Mallett and F. M. Marsh. All the articles have repute for medicinal virtue among the native people of the Philippine Islands. The drugs are designated by the English spelling of their native names; the botanical determination of the plants yielding them was not considered.

Dolulugai.—A seed of a light slate color and having a very hard testa. It is nearly spherical and about half an inch in diameter. The kernel is of a very solid texture, having a characteristic odor and a bitter taste. It is said that the natives dissolve the powdered dolulugai in vinegar and employ it as a specific for all pains of the stomach, also as a poultice in rheumatism. It was said to contain strychnine, but this is positively not so, since on analysis it gives entirely negative results. The principal constituents found on analysis were fixed and volatile oils.

Mountain Cinnamon.—A bark from one-fourth to one-half an inch thick, of a dark brown color and having an odor resembling a mixture of spices rather than the true cinnamon. It contains an aromatic volatile oil, tasteless resins, and a very large amount of coloring matter.

Manugal.—A very hard fibrous rhizome with rootlets, used by the natives as a stomachic, also as a purge by boiling thin shavings of it in cocoanut oil. It contains no alkaloids, but has a considerable portion of acid resins.

Vita.—A bark of a very thick, coarse texture, used as a remedy for fevers. Nothing was found to which its medicinal properties could be ascribed.

Macbujai.—From parts of drug in their possession the authors were unable to determine to what plant organ it belongs. It contains considerable resin, coloring matter and other plant constituents. The drug is excessively bitter, and is used in the form of a decoction as a remedy for fevers.

Tagalaoi.—Small branches or shoots having a bark about one sixteenth of an inch thick. The only important principle noted was a thick, balsam-like resin. It is used as an antiseptic. The usual mode of application is to boil the inner bark in cocoanut oil, and then use it in the treatment of wounds.

The work done on the above-mentioned drugs was, as far as the presence of alkaloids is concerned, of a decided negative character. None of the plants gave the slightest trace of their presence.

Arbuta.—The samples of this drug consist of billets, about $1\frac{1}{2}$ inches in diameter and several feet in length, of a tough, fibrous wood, having a very characteristic cross-section not unlike *pareira brava*. The wood beneath the bark is of a uniform yellow color. Upon extracting with acidulated alcohol, and applying the general reagents, the solution gave heavy precipitates for alkaloids.

From the fact that it colored the chloroform yellow when shaken out from the water solution led to the belief that the alkaloid was berberine, and by carefully conducted tests this was verified. It responded to all tests for that alkaloid, and the authors were able to produce the hydrochloride under the microscope.

As to whether a white alkaloid is present, as in many other berberine-bearing plants, the authors were unable to say. The limited quantity of material and small percentage of alkaloid present was insufficient to attempt a separation. The amount of berberine, or total alkaloid, if another be present, was one-tenth of 1 per cent.

THE RELATION OF THE PHYSIOLOGICAL ACTION OF THE ELEMENTS TO THEIR POSITION IN THE PERIODIC SYSTEM.

BY PROF. BEAL.

WHAT PERCENTAGE OF THE UNITED STATES PHARMACOPŒIAL PEPSINS OF THE MARKET COME UP TO THE PHARMACOPŒIAL REQUIREMENTS?

BY C. C. SHERRARD AND J. L. TEGARDEN.

Of the ten samples claiming to have a digestive power of 1 to 3,000, only two were found to substantiate this claim, and of these the authors found but one to meet their private ideas. Just what value this answer to the query possessed each member thought to decide for himself. The following papers were then read by title, and together with those previously presented, were referred to the Publication Committee.

CHINQUAPIN (*Castanea Pumila*, Mill.).

BY HENRY KRAEMER.

(Printed in full on p. 453 of this issue).

THE COFFEE BEAN AND A PROXIMATE ANALYSIS OF THE PULP.

BY ROBERT COMBS.

ANALYSIS OF CUCURBITA FŒTIDISSIMA AND IPOMŒEA LEPTOPHYLLA.

BY W. H. LANG.

AN ESSAY ON THE SPLEEN AS A DIGESTIVE ORGAN.

BY R. E. STUART.

The last three papers were presented by Prof. Sayre.

The section then adjourned until 7.30 P.M., at which hour Chairman Dohme called the third session to order.

The first paper presented at this session was one on

THE ASSAY OF ERGOT.

BY A. R. L. DOHME.

Mr. Dohme submitted this in answer to query 17, "Give the relative alkaloidal value, i. e., percentage of the cornutine of Keller, of Spanish, German

and Russian ergot." He applied Keller's method of assay for this drug to samples obtained in New York. The results were as follows:

German ergot—(a) . . . 0.15 per cent. cornutine of Keller	}	mean, 0.15 per cent.
(b) . . . 0.14 " " "		
(c) . . . 0.15 " " "		
Spanish ergot—(a) . . . 0.29 " " "	}	mean, 0.29 per cent.
(b) . . . 0.28 " " "		
(c) . . . 0.29 " " "		
Russian ergot—(a) . . . 0.18 " " "	}	mean, 0.18 per cent.
(b) . . . 0.19 " " "		
(c) . . . 0.17 " " "		

The author thought that until we know more of this cornutine of Keller, the best we can say is that Spanish ergot is more valuable than Russian ergot and this more valuable than German ergot.

QUERY 15.—IS THE DECIDEDLY DIFFERENT YIELD OF PILOCARPINE DUE TO TWO SPECIES OF PILOCARPUS? IF SO, WHAT ARE THE SPECIES AND WHAT IS THEIR RELATIVE CONTENT OF ALKALOIDS? IF NOT, WHY HAS PILOCARPINE BEEN SO SCARCE?

Mr. Dohme also presented a paper to deal with this question. He said that the appearance in the market of the small jaborandi leaves, called *Pilocarpus microphyllus*, was well known, and that in order to decide the query he had assayed several samples of this variety, as also of the variety *pennatifolius*, by Keller's method, which involves the titration of the alkaloids with decinormal acid solution.

The following results were obtained:

Philocarpus pennatifolius I. purchased in 1893—0.33 per cent. total alkaloids.	
" " II. " " 1894—0.18 " " "	
" " III. " " 1895—0.19 " " "	
" microphyllus I. " " 1894—0.16 " " "	
" " II. " " 1895—0.19 " " "	

From these results it would appear that *Pilocarpus pennatifolius*, formerly obtained, contained more alkaloid than the leaves recently obtained in this market. *P. microphyllus*, which has only made its appearance in this market during the last few years, contains as much alkaloid as the *P. pennatifolius* now in the market, and both contain less than the jaborandi leaves formerly obtained. The answer to the query, then, would be that the cause of the scarcity of pilocarpine is not the preponderance or substitution of any new variety of jaborandi leaves, but the deterioration of the drug in general, the yield having decreased during the past few years. Poehl¹ some time since obtained as much as 1.97 per cent. of alkaloids from jaborandi leaves, which he claimed were hairy and not smooth, while Budee and Miller² obtained from the ordinary smooth, large leaves, such as we usually meet with in this country, only as much as 0.19 per cent. alkaloids. Whether the hairy leaves, which yield the large percentage of alkaloids, are or are not any longer raised, the fact remains that the leaves which are now, and have been for some time, brought to this market, and apparently to Europe also, are of the smooth variety, and contain very much less alkaloid. It is hence probable that, until

¹ Poehl—Untersuchung der Blätter von *Pilocarpus officinalis*, St. Petersburg, 1879.

² Budee and Miller—Archiv für Pharmacie, 216, p. 25, 1880.

we again manage to import the hairy jaborandi leaves, the chances for the price of pilocarpine declining are not very favorable.

Prof. Ryan stated that the price of pilocarpine had advanced considerably, on account of the great demand at present existing for it. He also stated that the supply was not equal to the demand. Prof. Remington spoke of the great value of pilocarpine medicinally, and said that the source of such a remedy should be carefully watched, lest it be completely exhausted.

A COMPARISON OF THE BEST KNOWN METHODS FOR THE ASSAY OF COCA LEAVES.

BY A. R. L. DOHME.

The experiments were all made on the same specimen of Erythroxylon Bolivianum in No. 60 powder. The results were :

Keller's method	(a) . 0'78	per cent. total alkaloids	} mean, 0'79 per cent. total alk'ds.
	(b) . 0'80	" "	
Beckurts' method	(a) . 0'26	" "	} mean, 0'265 " "
	(b) . 0'27	" "	
Schweissinger's method	(a) . 0'52	" "	} mean, 0'505 " "
	(b) . 0'49	" "	
Thompson's method	(a) . 0'26	" "	} mean, 0'27 " "
	(b) . 0'28	" "	
Lyon's method	(a) . 0'17	" "	} mean, 0'165 " "
	(b) . 0'16	" "	
Lyon's method modified ¹	(a) . 0'32	" "	} mean, 0'31 " "
	(b) . 0'30	" "	

This shows how very much the different methods vary as to the amount of alkaloid they extract from the drug, and how important it is to use the best one if a correct assay of the drug is to be made. Keller's method so far exceeds all other methods in extracting the most alkaloid from coca leaves that comparisons are entirely out of place, Schweissinger's method, the nearest to it, being as much as 40 per cent. out of the way practically.

In the case of Beckurts' method, it was necessary to separate the chlorophyll from the alkaloid by dissolving the latter in weak acid, making this solution alkaline and shaking out with chloroform.

The formation of emulsions is very general in the case of this drug when shaken in alkaline solution with chloroform or ether, and was encountered in every assay, making the operations more tedious, as time was most frequently resorted to in order to bring about a separation of the liquids.

THE ALKALOIDAL VALUE OF IPECAC STEMS.

BY A. R. L. DOHME.

In previous experiments the author has shown that the cork cells and those of the cortical parenchyma adjacent to them are the seat of the alkaloids of ipecac root. Furthermore, he showed that the thinner root contains more alkaloid than the thicker or fancy root.

Since then it has been observed by the writer that what he termed "wiry" root is made up of two parts of the plant, viz.: the stem proper and the part of the plant that merges the root into the stem. While the stems are usually quite

¹ The modification consisted in using, instead of petroleum ether, a mixture of 70 parts of petroleum ether and 25 parts of official ether.

straight with a smooth surface, the part that merges it into the root is almost invariably twisted and slightly annulated. This then divided the ipecac root of commerce into three parts, *root*, *merging portion* and *stems* which shall here be designated respectively as fancy root, wiry root and stems.

Two lots, "A" and "B," of commercial ipecac root, were spread out separately, and each divided up into the three portions. All six portions were assayed by Keller's method, using titration with volumetric acid solution, and with the following results:

	Sample "A,"	Sample "B,"
Fancy root . . .	2'00 per cent. alkaloids.	2'33 per cent. alkaloids.
Wiry root . . .	2'13 " "	2'43 " "
Stems	1'77 " "	2'15 " "

From these results but one conclusion can be drawn, and that is that the wiry root, as was shown last year, is richer in alkaloid than the fancy root, and that the stems contain less alkaloid than either the fancy or wiry root, but still contain considerable alkaloid.

THE NEED OF AUTHORITATIVE STANDARDS FOR ANTISEPTIC SURGICAL DRESSINGS.

BY SEWARD W. WILLIAMS.

This paper also embodied the views of recognized surgical and pharmaceutical authorities as to the proper basis on which such standards should be established. The prime object of the paper was to obtain a decision as to what the label of antiseptic surgical dressings should bear. It was decided, after some discussion, that the label should state what percentage of the weight of the finished product was made up of medicament, and also how many grains per square yard or grammes per square meter this percentage represented. It was also thought well to state what strength of antiseptic solution would be obtained in case it was necessary to wet the dressing with water sufficient to saturate it. The author in his paper asked that a standard weight and count of threads in woven fabrics be established. No action was taken on this point by the section, but the consideration of the whole subject of the paper, which certainly needs attention, was referred to the Committee on National Formulary.

A REPORT OF THE ANALYSIS OF 27,000 PRESCRIPTIONS.

BY PROF. PATCH.

The object of this work was to ascertain the variety of medicines used and the extent of their use. The prescriptions were from all sections of the United States. Prof. Patch had expected to have reported on 50,000, and had mentioned this number in the name of his paper, but he was not successful in having that number sent to him. The report was accompanied by an extensive table which he had employed as a record in his work. He reported a large use of proprietary articles. Philadelphia led in the use of official preparations. Of the classes of preparations fluid extracts supplied eight per cent. of the calls and pills six per cent. Other classes of preparations fell below these figures. In the discussion that followed the paper, Prof. Hallberg moved that the term prescription statistics be substituted for prescription analysis, or analysis of prescriptions, in order to prevent a misunderstanding of the work. This motion was carried, as was also another, to invite State associations to

publish such statistics of this nature as they might have along with this list in the Proceedings of the American Pharmaceutical Association.

EXTRACTS OF COD LIVER OIL.

BY F. E. STEWART.

COD LIVER OILS.

BY C. C. SHERRARD.

He stated that he knew of no reason why the fish of this country could not be used for the production of as good an oil as is produced in Europe. The secretary then read by title a paper on the

ANALYSIS OF KOLA.

BY J. W. KNOX AND J. O. SCHLOTTERBECK.

and another entitled

LABORATORY NOTES ON PEPSIN, COCA LEAVES AND IPECAC ROOT.

BY L. F. KEBLER.

All of the papers of the session were referred to the Publication Committee. The next business of the section was the installation of officers for the ensuing year. These were Prof. S. P. Sadtler, chairman ; W. C. Alpers, secretary. The section then adjourned.

SECTION ON COMMERCIAL INTERESTS.

The section on commercial interests held a session at 9 A.M., on Monday, August 19th, in order to complete the business left over from the other two sessions. A paper was presented on

AMERICAN CHEMICAL INDUSTRIES.

BY N. A. KUHN.

The author thought the progress that has been made in chemical industries in Germany should be an impetus to American chemists. Mr. Hayes, of the Universal Trade Association, had been notified that the privileges of the floor would be extended to him at this particular session ; but in spite of this fact he was not present. The plan of the organization just referred to, was discussed by several of the members, but in view of the fact that some of the largest patent medicine manufacturing companies had refused to adopt the plan, the case seemed hopeless to those present. The section decided to await developments. Leo Eliel outlined a policy which he thought would provide something that would be practically valuable ; this, like the plan proposed by Clay W. Holmes, had as its foundation the thorough organization of the pharmacists. The report of the Committee on Tax-free Alcohol showed that the committee had carried out the instructions of the Association as given at Asheville, and had called upon the Secretary of the Treasury to do the Association's bidding. The results of this visit have already been made public. The report was accepted and adopted. Prof. Fennel moved that the section reaffirm the action taken last year by the Association on the subject of tax-free alcohol. This motion was opposed by Mr. Heckler and Mr. Snow. Mr. Ebert urged the adoption of the motion, stating that he believed tax-free alcohol, under the existing circumstances of to-day, would be the death knell of pharmacy in the United States. He argued that it would be impossible for any one to make any preparations, and that pharmacy would be reduced to merchandising.

The question was referred to a committee composed of Messrs. Heckler, Fennel and Cook, and these afterward suggested that the position taken in the matter last year be maintained.

A CURE FOR THE CUT-RATE PROBLEM.

BY C. S. KLEIN.

Chairman Seabury was re-elected for the coming year. Clay W. Holmes was elected secretary of the section, and Messrs. Scholtz, Sempill and McDonald selected as the other members of the committee. The officers of the past year were given a vote of thanks in recognition of their services.

SECTION ON PHARMACEUTICAL EDUCATION AND LEGISLATION.

The first session of this section convened at 10 o'clock in the morning of Monday, August 19th. President Simpson called the meeting to order, after which Secretary Kennedy read the minutes of council's meeting. The Publication Committee had decided to publish the revision of the National Formulary, and to bind it with the Proceedings. They also decided to have some copies bound separately, and fixed the price for such copies at fifty cents. The minutes were approved. Secretary Kennedy reported the applications of four persons for membership. The applicants were invited to complete their membership. The Association then adjourned. Chairman Good, of the Section on Pharmaceutical Education and Legislation, asked Professor Beal to occupy the chair while he delivered his address. The speaker mentioned the difficulties of getting pharmacy laws enacted, but he was not of the opinion that legislation alone would remedy all evils. Education and a proper appreciation of the responsibilities of pharmacy he believed to be potent factors towards the betterment of things. In speaking of degrees, he favored the title, Graduate in Pharmacy, and recommended experience before entrance at college. He thought those taking the degrees of Pharmaceutical Chemist and Doctor of Pharmacy should be required to attend college for a longer term than those receiving the degree of Graduate in Pharmacy. He suggested that the committee of the section be increased to five members. He thought the existence of several boards of pharmacy in one State, as, for instance, in the State of New York, was unnecessary. He recommended the passage by Congress of a law, making, after a short term of years, the metric system of weights and measures the only legal one, and suggested that a committee consisting of one delegate from each State association, be appointed to take charge of the matter. Professor Sayre moved that the recommendations be approved. W. C. Alpers moved that the address be referred to a committee of three for consideration, and that this committee report at a subsequent session of the section. The chair appointed as the committee: Messrs. Sheppard and McGill and Mrs. M. O. Miner. Chairman Good called for the reports of committees. Professor Hallberg reported on a sheet which had been sent out with the Proceedings for 1894. This sheet was issued by the section, and was intended to serve as a means of obtaining information that would be of value to the section. The sheet was divided under the four headings of poison legislation, registration statistics, college attendance and registration requirements. Copies of the sheet had been mailed to the boards of pharmacy of the different States, and their aid solicited, but for reasons unknown to the secretary of the section, some of the boards had not replied. Chairman Good asked that the committee

be given further time, as they had not been enabled to complete their labors, because of the difficulty of obtaining information. He also asked that the special committee on an outlined course of study for students of pharmacy be granted more time, stating, in connection with his request, that the colleges, when consulted on the subject, had, in most cases, replied simply by sending the announcements of their courses. Secretary Hallberg then reported what information he had been able to get on the several inquiries given on the sheet under the division of poison legislation. Massachusetts, Michigan and Wisconsin had sent in complete State reports of the deaths that occurred from poisoning during 1894. Louis Emanuel, of Pittsburg, Pa., had furnished the secretary with the report for that city. The whole number of reports that had been received covered about one-sixth of the country's population, and showed a total number of 900 deaths from poisoning during 1894. Morphine, carbolic acid, opium, arsenic, rough on rats, Paris green, strychnine, laudanum and chloroform were the poisonous substances most frequently employed. The report included all cases, whether accidental, suicidal or homicidal. It was received and referred for publication. Prof. Prescott inquired as to the completeness of the United States Census Report in the matter of poisoning. Prof. Hallberg did not think the report of sufficiently recent date to afford the information desired. He stated, however, that the report showed suicides by poisoning to be the greatest in numbers. He also stated that Mississippi and Minnesota, and some other States, had followed Georgia in the matter of requiring morphine to be wrapped in red paper and to be labelled with white letters. Some of the States require that arsenic be colored with charcoal or indigo, in order that its presence may be indicated. Secretary Hallberg then read a list of the States which require the registration of poisons. Prof. Prescott spoke of the importance of this matter, and advised the Association to give it proper attention. He mentioned the fact that indifference or carelessness in the sale and registering of poisons was often a source of disgrace to pharmacists, by virtue of the use of the substance for suicidal or homicidal purposes. It was moved and carried that a committee be appointed to draft suitable resolutions regarding the registration of poisons, and that a copy of the draft be sent to each Board of Pharmacy in the United States. The chair appointed Messrs. Prescott, Remington and Alexander to serve on this committee. C. S. N. Hallberg and J. H. Beal were nominated for chairman for the coming year. Dr. Bartley was nominated for secretary, and the nominations closed until the next session. A paper was then read on

REQUIREMENTS FOR GRADUATION.

BY S. A. D. SHEPPARD.

He favored three years' experience exclusive of time spent at college. He believed store experience to be absolutely necessary in the training for pharmacy. He thought the college has a better chance to determine the value of store experience than has the State Board; that the examination which the trustees usually give should be very stringent, more so than the examination of the State Board. He advocated leaving the degree of Graduate in Pharmacy untouched as an indication of college training and store experience. He thought other degrees should require proportionately more work, probably special work, but not necessarily store experience. Prof. Oldberg then read a paper on

BETTER EDUCATION IN PHARMACY.

BY J. B. NAGELVOORT.

The latter gentleman advocated a high standard for the persons engaged in the responsible positions of the business. Both papers were received and referred to the Publication Committee. Considerable discussion followed. All agreed that store experience was necessary for success in business. Prof. Prescott discussed the advantages and disadvantages of obtaining the store experience before and after college training. He believed it would be best for the student to pass from the High School into the College of Pharmacy without interrupting his habits of study, and stated that the graduates of the University of Michigan School of Pharmacy thought experience in the store after graduation produced better results than experience gained before attending college. Mrs. Miner thought college work and store experience should be alternated, the apprentice serving at least a year before attending college instruction. Prof. Caspari thought the practical experience a student would get in the laboratory of a college preferable to that which he would acquire in a store. Prof. Oldberg held the same opinion, and thought a student could readily obtain store experience after graduation. Messrs. Mayo, Hurty, Whelpley, Hallberg and McGill also participated in the discussion, which served to bring out the complexity of opinion on the subject of applying pharmaceutical education.

Adjournment was moved and carried.

The second session of the Section on Pharmaceutical Education and Legislation met at 3.30 P.M.

The reading of the minutes of the first session was dispensed with.

Nominations for officers during the ensuing year being again open, and no one else having been nominated, Prof. Beal withdrew his name for chairman, in order that Prof. Hallberg might be unanimously elected. Prof. Beal was then nominated for secretary, and Dr. Bartley, who had been nominated at the previous session, withdrew in order that Prof. Beal's election might also be unanimous.

Prof. Hallberg read a report on the registration statistics of the United States, which showed that fifty per cent. of the applicants for registered pharmacist's license in 1894 had successfully passed the examinations; that sixty-six per cent. of those taking the assistant's examination had been granted certificates; and that the whole number of pharmacists registered during 1894 was 3,500. The matter of regulating graduation requirements, which the Association had undertaken last year at Asheville, and which they sought to facilitate by sending out a sheet asking the opinion of colleges, was laid on the table by a vote of the session. Some of the members present expressed their hopes that the Association would, in the future, leave such matters alone. Mr. Sheppard recommended some requirements which would guarantee to State Boards that applicants for licenses had been afforded some actual practice. The recommendations were amended somewhat by Prof. McGill. They were then to the effect that an applicant for a pharmacist's license must have an academic education equal to that required for entrance to a high school, must have attended for six months a college of pharmacy, receiving during that time both didactic and laboratory instruction, and must show evidence of having had thirty-six months of practical experience exclusive of the time spent at college.

Mr. Ebert moved that the recommendations be referred to the state associations, and it was so ordered.

Prof. Hallberg, as secretary of the section, read a report on legislations that had dealt with pharmacy during the last two years. Its chief matter of interest was the changes that have taken place in the selection of the members of pharmacy boards and the organization of boards in States heretofore having no such body.

A NATIONAL PHARMACY, FOOD AND DRUG LAW NOT POSSIBLE UNDER THE PRESENT UNITED STATES CONSTITUTION.

BY PROF. BEAL.

The author claimed that the Federal Government can deal only with Interstate commerce, and that the states must regulate their own internal affairs as the constitution now stands.

Adjournment until 10 A.M. on the following day was ordered. At this hour, Tuesday, August 20th, the third session of the section was held after President Simpson had called to order a general session of the Association, in order that the minutes of Council might be read and disposed of. The members of the Committee on Transportation for next year were appointed. Sundry amendments to by-laws were recommended. The report of the Committee on Transportation was read. It recommended the passage of a special vote of thanks to the Sub-committee on Transportation, which consisted of Messrs. George R. Leis, R. J. Brown and C. E. Corcoran. The report was accepted and the vote of thanks passed. The general session then adjourned and the section began its final meeting. The reading of the minutes was dispensed with, and the order of business upon motion was reversed. Mrs. Miner read the favorable report of the Committee on Chairman's Address. The report was received and adopted. The Committee appointed to consider the President's Address made last year and regarding the curriculum of colleges, reported that a few of the colleges had responded to their call for information. The committee recommended that the courses outlined by Dr. Dohme and the University of Michigan be referred to the Committee on Publication. This recommendation was approved by the section. The first paper present at this session was

ON PROPOSED CURRICULUM, FOR CANDIDATES BEFORE BOARDS OF PHARMACY.

BY W. C. ALPERS.

The object sought by the author was the establishment of a standard curriculum for the United States, in order that pharmacy might have a national character and meaning. Mr. Ebert moved that the section send copies of the paper to the secretaries of the Boards of Pharmacy with the request that they consider the suggestions contained therein. The motion was carried, and Mr. Alpers was voted the thanks of the Association.

THE PRACTICAL SIDE OF TRAINING IN OUR COLLEGES OF PHARMACY.

BY JOSEPH JACOBS.

He thought the student should be instructed in things of such importance in pharmacy as the manufacture of perfumery and photographic materials, the adjustment of trusses, the decoration of windows and the art of advertising. He suggested that this class of instruction be added to the present curriculum, no part of which he wished to have annulled. A paper was then read on

SCHOLARSHIPS.

BY L. E. SAYRE.

He favored the establishment of the foreign scholarship proposed last year by Professor Patch. He believed it would be a good way to import new ideas. The paper was accepted and referred to a committee of Messrs. Sayre, Oldberg and Ebert. They were to consider the feasibility of carrying out the plan and were to report at the next annual meeting.

COLLEGE ATTENDANCE AND REGISTRATION REQUIREMENTS.

BY PROF. BEAL.

These subjects were two of the headings of the sheet sent out by the section. Secretary Hallberg then read the following papers by title :

"Pharmaceutical Degrees—What Should They Mean," by Dr. Bartley ; "Laws for the Prevention of the Adulteration of Drugs," by Professor Fennel; "The Position of the American Pharmaceutical Association Towards Pharmaceutical Education," by Professor Kremers ; "Registration Requirements of American Pharmacy Laws," by Professor Beal; and "The Metric System—Its History and Introduction," by R. A. Sauerhering.

The papers were all accepted and referred to the Publication Committee. Prof. Hallberg was installed as the chairman of the section for the ensuing year, and Prof. Beal as the secretary. W. R. Ogier was selected by them as one of their associates; the other two are yet to be chosen. Prof. Oldberg moved that the section tender the officers of the past year a vote of thanks for their efficient services. It was so ordered. The section also voted its thanks to Mr. John Koehan as a recognition of his herbarium of Colorado plants, which he displayed in the meeting room. The section then adjourned.

FINAL GENERAL SESSION.

The final general session, which had been advertised on the programme to meet at 10 A.M., on Wednesday, August 21st, convened on Tuesday evening, at 8.30. President Simpson called the meeting to order and directed that the minutes of the last session of council be read. At this session Mr. Alpers had moved that any member buying five copies or more of the separately bound National Formulary be allowed the dealer's discount of one-third. Mr. Sheppard moved that the price of the volumes of Proceedings prior to 1890 be reduced to one-half of the price now asked. Both motions prevailed. The minutes of the council were approved. It was moved and carried that the title *Permanent Secretary* be changed to *General Secretary*. Prof. Hallberg read his revision of the by-laws, the greater part of which was adopted. It was agreed to make the chairmen of the sections and of the committee on the revision of the U. S. Pharmacopœia members of council, thus increasing the membership of that body from seventeen to twenty-one. It was moved and carried that the local secretary be made a member of the transportation committee and its chairman. After paying yearly dues for forty years it was agreed that an active member should be entitled to life membership. To necessitate an extension of the life of railroad tickets to the places of future meetings, a motion prevailed to add sufficient social features to accomplish this.

The permanent secretary said he had received the report of the reporter on progress of pharmacy, and that the reporter for the past year, Henry Kraemer,

was in Europe. The report of the Auditing Committee certified to the correctness of the accounts. The report of the Committee on the Status of Pharmacists in the Army and Navy of the United States, which had been referred to this session, was submitted. The committee had done a great deal of good work. The report was accepted and the committee continued. Mr. R. A. Sauerhering, a member of the association and a Member of Congress from Wisconsin, presented a bill which he proposed to present in Congress making the metric system of weights and measures the only legal system on and after July 1, 1900. The communication was referred to the committee having this matter, in hand, and later they reported their approval of it. The committee on the president's address heartily approved of his ideas to elevate the educational standard of apprentices. A vote of thanks was given to the President.

The finance committee was instructed to appropriate a sum not to exceed \$200, for the use of the section on commercial interests in organizing the pharmacists of the country, with a view of remedying the present evils. The same committee was ordered to appropriate \$20 to defray the expenses of materials incurred by the committee on indicators. Dr. F. E. Stewart proposed that the chair appoint three members to act as a National Legislation Committee by regulating laws inimical to pharmaceutical interests. This proposition met with the approval of the Association. A tax-free alcohol motion was tabled. The chairman of the section on scientific interests reported regarding the observation sheet which he had sent to all members. The number of replies which he had received was small in proportion to the membership. Mr. Sheppard moved that the local secretary be made the chairman of the committee on arrangements. The association agreed. The committee on National Formulary and the special committee on membership were instructed to continue their work. Messrs. Wooten, Dimmitt and Eliel were appointed a committee on trade interests. The Librarians' Association, which was holding its annual meeting in Denver, and the American Pharmaceutical Association exchanged fraternal greetings. Mr. Seabury moved that a delegation of five be appointed by the chair to represent the American Pharmaceutical Association at the meetings of the National Wholesale Druggists' Association and Proprietors' Association. Messrs. Ford, Gordon, Ward, Thompson and Scholtz were assigned to this duty. The newly-elected President and third Vice-president were formally installed after being conducted to the chair by Prof. Remington and Mr. Ebert. The retiring officers were given a rising vote of thanks.

President Good then appointed the following committees: General Prizes, Messrs. Patch, Rice and Kaufmann; Revision of the United States Pharmacopœia, Messrs. Eliel, Stevens, Bartley, Klie and A. R. L. Dohme; on National Formulary, Messrs. Diehl, Hallberg, Klie, Fennel and Conrath. He reappointed the delegates to the section on materia medica and pharmacy of the American Medical Association. The members then attempted to express their gratitude for the kind treatment and thoughtful attention they had received from every one in Denver, and decided that the chair should appoint three members to draft suitable resolutions on the subject and to publish the same in the papers of the city. President Good appointed Messrs. Thompson, Dohme and Barnum to attend to this matter, and the Association decided that the local secretary, local committees, ladies' reception committee, local press, Chamber

of Commerce, druggists of Denver, hotel-keepers, citizens of Denver, Governor of the State and Mayor of the city, should all be mentioned therein. The Association adjourned at midnight to meet in Montreal, on August 12, 1896.

On Monday evening, August 19th, the Association attended a grand organ recital at Trinity Methodist Church, under the direction of Dr. Gower. On the afternoon of Tuesday, August 20th, an electric car ride was given the members by the Denver Chamber of Commerce. The route was through the streets of Denver to suburban resorts, and started from the Brown Palace Hotel. On Wednesday morning the members of the Association left Denver. Those who did not immediately return home either went on the excursion around the "Circle," which had been advertised, or a lately organized excursion to Salt Lake City.

NOTES AND NEWS.

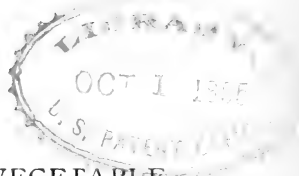
The *Chemist and Druggist*, of London, issued a monster midsummer number on July 27th. It is weighty evidence of what can be done in London in the advertising line. Except in "mere bigness" the reading matter was as meritorious in its line as the advertisements were in theirs.

The *Archiv der Pharmacie* devotes its whole issue of July 31, nearly seventy pages, to a biographical sketch of the late Professor Flückiger, by Professor E. Schär. Additional value is given to this paper by the very complete chronological list of Flückiger's contributions to science, beginning with the first one in 1852, and continuing to within a very short time of his death, the last having been written in Brooklyn and published in the *Pharmaceutische Rundschau*, of New York. Flückiger's papers, books and reviews number considerably over 400.

The *Pennsylvania Board of Pharmacy* held an examination at Williamsport, the latter part of July. Ninety applicants for registration appeared for examination. Sixty-one applied for registered pharmacist certificates, and twenty-nine for qualified assistants certificates. Thirty-six of the former and twenty of the last named passed the examination successfully. The next meeting of the board will be held in Philadelphia and Pittsburg in the month of October. Persons desiring to be examined at that time should write to the secretary, Charles T. George, Harrisburg, Pa., on or before the 1st of October, for application blanks and full information as to the exact time and place of meeting. The following persons were successful at the Williamsport examination: Charles Kleinfelter, George G. Strott, B. F. Cain, Wm. W. Long, C. W. Lindig, Samuel S. Wendle, W. S. Klonski, Stanley Szarzynski, DeForrest Hart, Paul Herbert Gross, Harry Lewis Horst, D. F. Everett, Frank Howard Snyder, J. R. Smythe, F. A. Bunting, J. W. Starr, L. A. Kessler, S. A. Geakle, Edythe Weston, Philip L. Barbmment, J. A. Faessel, E. O. Franke, H. A. Spilker, J. D. Lehman, O. C. Bresser, Charles Poomsky, B. Perlman, C. L. Freeman, W. R. Lauterbacher, C. F. Schminkle, O. G. Fegley, A. C. Aichner, L. G. Nail, R. A. Simpson, W. M. Porter, C. B. Long, P. W. H. Schearer, Nicholas F. Weissner, M. D. Lingle, E. Q. Anewalt, George F. Hileman, William S. Warfel, H. A. S. Shuler, J. Willis Hall, Theodore E. Meyers, Thomas C. Waters, A. J. Civins, Chas. W. Harter, Louis Frank, Wm. B. Goff, Arthur C. Ried, Thos. E. Fording, Marcus C. Williams, R. B. Seybert, Harry G. Hollar.

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ACIDIMETRIC ESTIMATION OF VEGETABLE ALKALOIDS.

A STUDY OF INDICATORS.

BY LYMAN F. KEBLER.

That this method seems intangible and unsubstantial to some minds, probably supplies the firmest grounds for hopeful anticipations concerning its future perpetuity. A new method is not propounded and established in a day, springing into existence completely armed, like Minerva from the head of Jupiter, or adorned in all its beauty like Venus from the foam of the sea. As chemistry is the offspring of physics or the science of molecules, which in turn was developed from mechanics or the science of masses, so titration of alkaloids with volumetric acid solutions has been evolved from the study of the basicity of alkaloids on the one hand, and the behavior of alkaloids with indicators on the other.

The method appears to have sunk into a state of quiescence from time to time, for as early as 1846 M. Schlössing¹ proposed the method and applied it to the titration of nicotine with a view of establishing its equivalent; using sulphuric acid and litmus in his work.

Sixteen years later the work was taken up by Wittstein,² who was followed by F. M. Brandl,³ Liecke,⁴ Kosutany⁵ and G. Dragen-dorff.⁶ Up to this time, nicotine and coniine were the only alkaloids operated on, and litmus the only indicator employed. In 1879 L. van Itallie⁷ extended the work to several other alkaloids, using lacmöid as indicator. A. W. Gerrard⁸ a few years later employed

¹ Numerical references at the end of the article.

litmus and phenolphthalein in titrating the alkaloids of belladonna. From the contributions of O. Schweissinger,⁹ who used cochineal as indicator, E. Dieterich¹⁰ and P. C. Plugge,¹¹ dates the impetus titration of alkaloids with volumetric acid solutions received at the beginning of the present decade.

The method had been gaining ground rapidly when several most valuable communications appeared by C. C. Keller,¹² of Zürich, since which gigantic strides have been taken.

In volumetric analysis the first question demanding attention is a suitable indicator of delicate end reaction. The object^a of this communication is to present the results of a study of five indicators in titrating alkaloids, thinking, perhaps, it might be of some service in formulating systematized methods of analysis in alkaloidal chemistry. The discordant results of analysis often obtained by different chemists operating on the same sample are greatly to be regretted. It is the writer's candid opinion that the discrepancies are chiefly due to differences in *modus operandi*, defective apparatus, and in volumetric analysis different end reaction tints, arbitrarily assumed by each worker.

In order to eliminate the factors of uncertainty as completely as possible, the methods of operation were carefully written out and closely adhered to in all the work. The burettes and a pipette were carefully calibrated in order to ascertain the necessary factor for correction. The method of calibration was as follows: each burette and pipette was exactly filled to the zero mark with distilled water, at 15° C., and 10 c.c. delivered into a tared weighing flask and weighed; then the next 10 c.c. were treated in the same manner, and so on until the entire capacity of each was tested. A glass-stoppered cylinder was also standardized. All efforts to standardize a litre flask were thwarted. A large balance, sufficiently sensitive to do the work satisfactorily, could not be found.

In titration the personal equation plays an important part. Authorities are not agreed on end reaction tints, each operator relying on his own judgment. The writer thinks it correct to titrate to the point where a different color from the initial one is developed. In order to obtain standard end reaction tints, it will

^a Alkaloids, generally, are neutral to phenolphthalein, consequently it cannot be employed in titrating alkaloids directly. It is available for indirect titrations, *i. e.*, estimating the amount of acid combined with an alkaloid in its neutral salts.

be necessary to prepare some absolutely pure alkaloid; treat a molecular quantity of the alkaloid with an equivalent of the acid in question to form a neutral salt, then add one drop more of the decinormal acid for an acid color reaction. For alkaline tints add one drop of the centinormal alkaline solution to a solution of neutral salt, theoretically prepared.

In this work the writer titrated from acid to alkaline solutions as follows: Brazil wood, from yellow to onion-red, the purple ultimately fading to this; cochineal, from yellow to bluish-red; hæmatoxylin, from yellow to brown-orange; litmus, from red to onion-red, and methyl orange from red to straw-yellow.

The indicator solutions were prepared according to the most approved processes. Cochineal and litmus were prepared according to the specifications of Sutton's volumetric analysis, sixth edition. Phenolphthalein, 1 gramme dissolved in one liter of 50 per cent. alcohol. Hæmatoxylin, well crystallized, 1 gramme dissolved in 100 c.c. of strong alcohol. The method best suited for preparing the Brazil-wood solution, is to place 3 grammes of the wood into a casserole, add 10 c.c. of distilled water, boil gently for a few minutes, cool and filter. A freshly prepared solution has given the writer the most satisfactory results. Methyl orange, 1 gramme dissolved in 1 liter of distilled water. Considerable difficulty was experienced in obtaining even a fairly satisfactory product of methyl orange. The method proposed by Mr. B. Reinitzer,^a for preparing the litmus solution, did not come to the writer's notice until considerable work had been done with the solution prepared as above.

In titration, the following quantities of the several indicators were employed; methyl orange, Brazil wood, cochineal and phenolphthalein, 5 drops each; litmus, 10 drops, and hæmatoxylin, 3 drops.

The standard solution employed in this investigation, from which the exact strength of the other volumetric solution was determined, was a solution of normal sulphuric acid. This solution was prepared from data obtained by the several methods; titration against pure anhydrous sodium carbonate, using the above indicators; precipitation as barium sulphate, and Weinig's^b process. After some experi-

^a 1894, B. Reinitzer, *Zeit. f. angewand. Chem.*, 547 and 573; *Chem. News*, 70, 225, 239 and 249.

^b 1892, *Zeit. f. angewand. Chem.*, 204; *Analyst*, 17, 99.

mentation, it was found that Weinig's method gave the most satisfactory results. The following are the data obtained from an approximately normal sulphuric acid solution with the above methods :

Methods.		Number of c.c. of Acid Solution required per 10 c.c. of Normal Sodium Carbo- nate.	Grammes of SO_3 in 10 c.c. of the Acid Solution.
Sodium Carbonate.			
Indicators.	Brazil wood	9.50	0.4211
	Hæmatoxylin	9.54	0.4192
	Cochineal	9.50	0.4211
	Litmus	9.50	0.4211
	Methyl orange	9.50	0.4211
	Phenolphthalein	9.45	0.4216
	Weinig's method	—	0.4247
	Barium sulphate method .	—	0.4200

Due precaution was taken to boil the solution thoroughly with the indicators requiring it. With solutions of the above strength it was impossible to detect any difference in the sensitiveness of most of the indicators.

With the normal sulphuric acid solution a normal solution of pure potassium hydroxide was standardized. From the normal sulphuric acid solution and normal alkaline solution there were prepared, respectively, a decinormal acid solution and a centinormal alkaline solution. The two solutions thus prepared were carefully titrated against each other, employing the above indicators with the following results :

Indicators.	Number of c.c. of Normal Sulphuric Acid.	Number of c.c. of N-100 KOH required per 10 c.c. of N-10 H_2SO_4 .	
		La Wall.	Kebler.
Phenolphthalein	10	101.80	102.00
Brazil wood	10	99.56	100.00
Cochineal	10	100.58	99.80
Hæmatoxylin	10	99.76	100.00
Litmus	10	99.97	99.60
Methyl orange	10	92.67	98.53

My associate, Mr. La Wall, took up a portion of the work, which he executed independently, using, however, the same solutions and apparatus that the writer employed. The above and all subsequent results are the average of duplicate, triplicate or more titrations.

The titration of pure alkaloids, as found in the market, was next undertaken. With quinine and codeine the following method was used: two grammes of the alkaloid were placed into the cylinder, dissolved in alcohol and diluted up to 100 c.c. with alcohol. To 10 c.c. of this solution and the requisite quantity of indicator, contained in a suitable beaker, the decinormal acid solution was added to slight excess, agitated, allowed to stand a few minutes, the sides of the beaker well washed down with distilled water, adding about 40 c.c., and the excess of acid titrated back with the centinormal alkaline solution.

With alkaloids not freely soluble in alcohol, the following procedure was adopted: two grammes of the alkaloid were placed into a 200 c.c. beaker, 75 c.c. of decinormal acid added, the contents of the beaker warmed on a water bath and occasionally agitated until the alkaloid was dissolved. The beaker and contents were then cooled, the contents transferred to a 100 c.c. cylinder, the beaker carefully rinsed with several successive portions of water, transferred to the 100 c.c. cylinder, and finally made up to 100 c.c. with water. Each 10 c.c. contained 0.2 grammes of alkaloid and 7.5 c.c. of decinormal acid solution. After adding the requisite amount of indicator to 10 c.c. of the alkaloidal solution, and diluting up to about 50 c.c., the excess of acid was carefully retitrated. Two or more titrations were made in every case, with the same solution and indicator, by adding to the solution just finished another portion of decinormal acid solution and retitrating with the centinormal alkaline solution, taking finally the average reading.

The above methods of titration and preparation of solutions were

Indicators.	Quinine. La Wall.	Quinine. Kebler.	Strychnine. Kebler.	Morphine. Kebler.	Codeine. Kebler.
Brazil wood	99.90	101.97	99.36	98.93	95.75
Cochineal	105.56	102.54	103.20	99.08	97.09
Hæmatoxylin	99.81	103.37	100.03	98.17	95.90
Litmus	101.80	103.55	103.54	98.93	96.38
Methyl orange	—	123.27	104.21	100.59	98.11

employed with several pure alkaloids. The results are tabulated at bottom of the preceding page.

The number of times the analyst is requested to investigate the purity of refined alkaloids is comparatively small, but the crude alkaloids claim a greater share of his time and attention.

The next step was to investigate the adaptability of the above process to crude morphine and crude cocaine.

Indicators.	Crude Morphine. La Wall.	Crude Morphine. Kebler.	Crude Cocaine. Kebler.
Brazil wood	99.23	98.47	95.90
Cochineal	100.14	99.53	97.11
Hæmatoxylin . . .	99.08	97.59	95.74
Litmus	99.50	98.93	96.82
Methyl orange . .	102.10	100.02	100.14

With the same crude morphine the ash method yielded 97.59 per cent.; the lime-water method 98.22 per cent., and the absolute alcohol method 98.33 per cent. of pure morphine.

A complete analysis was made of the crude cocaine, to ascertain how nearly the titrations corresponded with the gravimetric process of Dr. Squibb.^a

	Per Cent.
Moisture	0.405
Cocaine, nearly pure	97.300
Material soluble in ether	0.100
Material insoluble in ether	1.810
Loss	0.385
Total	100.00

Notwithstanding the fact that crude alkaloids claim considerable attention on the part of the analyst, yet only a few are found already extracted on the market. It generally happens that the operator is requested, not only to determine the amount of pure alkaloids, but also to extract them from their natural sources. For this purpose the writer employed a modification of Keller's process. The method is as follows: place 10 grammes of the dry drug into a 250 c.c. flask, add 25 grammes of chloroform, 75 grammes of ether, stopper the flask securely, agitate well for several minutes, add 10 grammes of

^a *Ephemeris*, 3, I, 171.

10 per cent. ammonia water, then agitate frequently and during one hour. On adding 5 grammes more of 10 per cent. ammonia water and shaking well, the suspended powder agglutinates into a lump, the liquid becomes clear after standing a few minutes and can be poured off almost completely.

A. When the mixture has completely separated, pour off 50 grammes into a beaker, evaporate the solvent on a water bath, add 10 c.c. of ether and evaporate again. Dissolve the varnish-like residue in 15 c.c. of alcohol, with heat, add water to slight permanent turbidity, the requisite quantity of indicator and an excess of the acid solution; retitrate with the centinormal alkaline solution.

	La Wall.	Kebler.	La Wall.	Kebler.	La Wall.	Kebler.	La Wall.	Kebler.
Indicators.	Per Cent. of Alkaloids in Nux Vomica by Process A.		Per Cent. of Alkaloids in Nux Vomica by Process B, Gravimetrically.		Per Cent. of Alkaloids in Nux Vomica by Process B, Volumetrically.		Per Cent. of Alkaloid in Ipecac Root by Process A.	
B. W.	2'04	2'58	2'94	3'00	2'37	2'37	2'46	2'54
C.	2'64	2'69	2'86	3'10	2'42	2'39	2'59	2'49
H.	2'18	2'24	2'88	3'11	2'23	2'27	2'48	2'54
L.	2'38	2'34	2'93	3'05	2'55	2'37	2'55	2'57
M. O.	3'02	3'64	2'93	3'02	2'65	2'61	2'95	3'30
	Per Cent. of Alkaloid in Ipecac Root by Process B, Gravimetrically.		Per Cent. of Alkaloid in Ipecac Root by Process B, Volumetrically.		Per Cent. of Alkaloids in Belladonna Leaves by Process B, Gravimetrically.		Per Cent. of Alkaloids in Belladonna Leaves by Process B, Volumetrically.	
B. W.	2'58	2'60	2'36	2'35	0'26	0'20	0'19	0'15
C.	2'63	2'68	2'52	2'33	0'28	0'20	0'24	0'14
H.	2'58	2'68	2'35	2'33	0'27	0'22	0'21	0'13
L.	2'62	2'60	2'40	2'25	0'24	0'18	0'20	0'15
M. O.	2'66	2'63	2'89	2'61	0'25	0'20	0'23	0'20

NOTE.—B. W. = Brazil Wood, C. = Cochineal, H. = Hæmatoxylin, L. = Litmus, and M. O. = Methyl Orange.

B. When the mixture has completely separated, pour 50 grammes into a separatory funnel, treat at once with 20 c.c. of acidulated water; after thorough agitation and complete separation, remove the aqueous solution into a second separatory funnel. Repeat the above operation twice more successively with 15 c.c. of slightly acidulated water. The acidulated water in the second separatory funnel is rendered alkaline with ammonia water, the alkaloid removed, successively, with 20 c.c., 15 c.c., and 15 c.c., of a mixture of three parts (by volume) of chloroform and one part of ether.

Collect the chloroform-ether mixture in a tared beaker, and distill off the solvent. The varnish-like residue is twice treated with 8 c.c. of ether, evaporated on a water bath and dried to constant weight on the water bath. The varnish-like residue is dissolved in 15 c.c. of alcohol and treated as in *A* above.

Nux vomica and *ipécac* root were treated according to processes *A* and *B*; *belladonna* leaves according to process *B*.

According to the well-established method of Messrs. Dunstan^a and Short, the *nux vomica* examined contained 2.89 per cent. of crude alkaloid. On carefully titrating this crude product with a volumetric acid solution, 2.12 per cent. of pure alkaloid was indi-

Indicators.	Per Cent. of Alkaloids in Fluid Extract of <i>Nux Vomica</i> by Process <i>A</i> .		Per Cent. of Alkaloids in Fluid Extract of <i>Nux Vomica</i> by Process <i>B</i> , Gravimetrically.		Per Cent. of Alkaloids in Fluid Extract of <i>Nux Vomica</i> by Process <i>B</i> , Volumetrically.	
	La Wall.	Kebler.	La Wall.	Kebler.	La Wall.	Kebler.
B. W.	1'62	1'70	2'02	2'00	1'70	1'61
C.	1'77	1'76	1'97	2'01	1'74	1'64
H.	1'61	1'67	2'01	1'96	1'58	1'50
L.	1'69	1'72	2'02	1'94	1'59	1'55
M. O.	2'01	1'92	2'01	1'94	1'92	1'82
	Per Cent. of Alkaloid in Fluid Extract of <i>Ipecac</i> Root by Process <i>A</i> .		Per Cent. of Alkaloid in Fluid Extract of <i>Ipecac</i> Root by Process <i>B</i> , Gravimetrically.		Per Cent. of Alkaloid in Fluid Extract of <i>Ipecac</i> Root by Process <i>B</i> , Volumetrically.	
	La Wall.	Kebler.	La Wall.	Kebler.	La Wall.	Kebler.
B. W.	1'74	1'78	1'75	1'86	1'67	1'67
C.	1'79	1'80	1'76	1'80	1'72	1'72
H.	1'77	1'86	1'74	1'74	1'65	1'65
L.	1'74	1'74	1'73	1'80	1'66	1'60
M. O.	2'00	1'95	1'74	1'79	1'92	1'88

cated. *Cochineal* was used as indicator. These figures show that this method produces an alkaloidal residue containing a smaller percentage of pure alkaloid than that obtained by Keller's process.

The writer's attention was next directed to the fluid extracts of *nux vomica* and *ipécac* root, whose alkaloids were extracted as follows: place 12 grammes of the extract into a 250 c.c. flask, dilute with 12 grammes of distilled water, agitate well, then add 30 grammes of chloroform and 90 grammes of ether, stopper the flask securely and shake well. Add 6 grammes of 10 per cent. ammonia water, and agitate the mixture frequently during half an hour.

^a 1883, Pharm. J. Trans. (3), 13, 665.

Allow the mixture to separate completely. Treat 50 grammes of the chloroform-ether mixture according to processes *A* and *B*.

The great difficulty with a number of the processes in vogue is the formation of obstinate emulsions. Of the many assays made by the above process, not more than one per cent. formed emulsions. The results were obtained with *nux vomica* and *ipecac*, as shown in chart on opposite page.

From the results embodied in this paper it can safely be concluded that methyl orange cannot be numbered with the indicators suitable for titrating alkaloids. It fails to give satisfactory results with N^{100} , N^{50} , and stronger solutions. Notwithstanding the sensitiveness claimed for methyl orange, the writer believes that its days, as an ideal indicator, are numbered. Even Prof. Lunge, the staunch advocate of methyl orange, has admitted that a properly prepared solution of litmus is quite superior to this indicator in inorganic titrations.

A solution of litmus, prepared according to the directions herein employed, is quite unsatisfactory for delicate titrations. The method proposed by Reinitzer promises to be better suited.

Of the indicators thus far considered, hæmatoxylin, Brazil wood and cochineal give very promising results. Hæmatoxylin justly claims first place, and Brazil wood second. Other indicators will be considered in due time.

As stated above, the prime object of this investigation is to ascertain what indicators are best adapted to the titration of alkaloids; but in order to determine how reliable the results were, gravimetric determinations necessarily formed a part of the work.

When it is remembered that not only do analytical methods contain inherent limitations, but also that each operator possesses a positive or a negative equation of error, the reader will undoubtedly concur with the writer that the results are very satisfactory. Attention must again be called to the fact that the work was conducted under precisely the same conditions.

As would naturally be expected, the amount of alkaloid obtained by process *B* is smaller than that secured by process *A*. A small per cent. of the alkaloid may be lost during the process of extraction; the small amount of coloring matter possibly vitiates the results, or perhaps some non-alkaloidal substance increases the yield.

From the hundreds of assays made by the author, he feels justified in stating that all of the gravimetric processes yield products con-

taining considerable non-alkaloidal matter, and hopes that the day is not far distant when all gravimetric results will at least be supplemented by volumetric methods if not displaced by them.

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MINERAL WEALTH OF SOUTHERN STATES.

BY WILLIAM B. THOMPSON.

Mr. H. C. Demming, formerly State Stenographer, a gentleman well known and much esteemed by the druggists of Pennsylvania, whom, in the deliberations of the Pennsylvania Pharmaceutical Association, he has frequently served in his professional capacity, writes to the *Philadelphia Times*, under date of August 19th, a highly interesting account of the unusual mineral development of a region embraced in Virginia, the Carolinas and Georgia. Almost every known production of mineral has been found, including such rare gems as the diamond and ruby. A conclusion naturally suggested by the statements of Mr. Demming is that we have become so accustomed to the figures and statistics of the enormous soil products of this country, as well as its staple mineral and metal resources, that we have yet to realize the wealth of that which lies hidden in its vast geological formation. The interest of the student must be awakened to the future importance of these products to science and art. As an illustration of the latter adaptation, reference may be made to the group which includes corundum, zircon, and monazite, the last of which now enters largely into the composition used in the Welsbach light and other similar purposes, both in the United States and Europe. Monazite appears to be a highly composite mineral, and in a conglomerate state has been sold from the mine in quantity as great as five tons per day, at \$200 per ton. It is valued for containing such associate substances as thorium, cerium, didymium, rhodium, lanthanum and yttrium. "Two per cent. of thorium," Mr. Demming says, "makes monazite a very salable mineral in Europe," whilst he also states that he has found in good specimens of this mineral as high as 27 per cent. of cerium oxide. The number and variety of precious stones and minerals which have been found exceeds thirty, including almost every known kind. Many of these, when set and polished, are of great natural beauty, and of sufficient character to attract the notice of the lapidary. The particular interest, however, which these facts furnish to pharmacists may be found in the adaptation of some of these more rare mineral specimens to the purposes of therapy and bacteriology. Investigators in England, France and Germany are, at the present time, engaged in determining certain properties which are supposed to pertain to these, naturally, and as bases for compounds

and chemical salts. It is well known that minerals which, in their natural or crude state, prove toxic to animals when chemically or otherwise combined, are found to be highly useful as prophylactics against the poison of germs and bacilli, causes assigned by modern theory as the origin of phthisis, diphtheria, cholera and variola. If such should prove to be well established, the *new* South will assume a greater interest, and her soils yield a deposit of greater value to mankind and to human science than can be estimated or computed by money value. The letter of Mr. Demming will amply repay a most attentive perusal.

PHILADELPHIA, August 28, 1895.

A SUGGESTION OF A USE FOR THE RARE METALS.

BY HENRY C. DEMMING.

Microbes are coming to the front in pharmacy. The day is not far off when the skilled pharmacist will find it necessary to have a good microscope, as well as much knowledge of botany. But he will not be able to stop there. Scientific research now demonstrates that pharmacy may soon require mineralogy as a handmaid to botany. The reason of this is apparent to any one who has kept abreast of the strides of the most eminent scientists of our day. Several very learned and able men found the microbe which exists in disease; and others, notably Professor Koch, found the microbe that exists in pulmonary diseases. Some other scientific mind or minds found that bacteria belong to the vegetable kingdom; at least, that is claimed by able investigators just now.

Then, patient investigation has led to the discovery of different families of bacilli. For instance, one species is dominant in pulmonary diseases, another in diphtheritic cases, another in scarlet fever, another in smallpox, and still another—more attenuated—in Asiatic cholera. Possibly membranous croup has its peculiar bacterium, but I believe that has not been definitely ascertained. Neither has it been ascertained, as yet, the peculiar species which may exist in cases of aggravated diphtheria. The molecular disintegration of the cellular tissues of the brain possibly has its own peculiar family of bacteria, and even earache may be traceable to a distinct species.

Then, further patient research—and I think much of this is due to the labors of C. A. Mitchell—has led to the publication of the fact that there are, at least, seventy distinct species of color-producing

bacteria, many of which are perfectly harmless to man. The bacteria discovered in the corners of the mouth of a healthy person, though extremely poisonous and dangerous in certain conditions, can be classed usually with the harmless varieties.

But, before I go into deeper water—and perhaps I ought not to go deeper in an article at this time—it has been made manifest that these different colored micro-organisms require different treatment, to lead to their annihilation. The several species capable of throwing off a reddish coloring matter—from the faint pink to the deep blood-red—may require quite different treatment to lead to their destruction than would be required for bacteria producing a blue color—from the light slate-blue to the deep blue color of the thousand-fathomed sea. So with the green, the violet and the brown, as well as the other colors.

Some labor will have to be spent in determining accurately which are injurious to human life, and which are harmless in health; then to determine which become harmless to one apparently healthy, and incapable of enduring much exposure. Then comes the task of determining which are most injurious when disease appears, when disease is well under way; and how the microbes are to be treated, if treated at all, when the disease has shown signs of conquest.

In these investigations it has already been clearly demonstrated that the products of the botanical world are futile, no matter how administered, when certain microbes appear. Dr. Meade Bolton, in England, followed out some experiments which had previously been carried on by others, until he realized that there are certain metals which are capable of destroying microbes in contact with them. He cultivated certain species in jelly, spread upon a plate; and bits of metal were dropped upon the jelly while it was still moist. He found that any metal that could arrest the development of microbes destroyed them; not only those which came in direct contact with the metal, but other microbic life for a narrow space around the metal. This potentiality varied, not only with the kind of metal, but with the species of microbes. He found that pure gold produced no effect; neither did pure nickel, nor platinum, nor a few other metals that he tried. But copper, zinc and silver were effective in some instances, though cadmium acted quickly and effectively in almost, if not, every instance. The learned doctor observed that the metals which affect the microbes were those that

are readily attacked by chemical reagents, while those that resisted such reagents, like gold, had no effect. He concluded that the action upon the organisms was due to the solution of the metals taking place in the jelly.

But what a wide field he has opened!

Here is a world for exploration, with promise of rich reward. You have many readers of an investigating turn of mind. Many of them have their own private microscopes, and bacteria are to be found on every hand in abundance. Metals of some description are on every shelf. Who will be the first to discover that some other metal than cadmium is destructive of the peculiar species of bacteria so prevalent in serious cases of scarlet fever; and then how many diseases, with their peculiar species, there are in this wide world of disease and death?

It may be necessary, in conducting these experiments, to resort to many species of the rarer minerals, and to reduce these species to metals and solutions. But we have the young men who have the ability, the skill, the patience and the time to solve the important problems.

The question may arise where to obtain the metals or minerals. Having given this subject much special study during the past fifteen or twenty years, perhaps I can supply the key whereby any known mineral or metal can be provided when wanted. It is a remarkable fact that when a so-called rare metal is required for commercial use, that somebody, somewhere, will, in a comparatively short time, be able to supply the article.

Take our Welsbach light, manufactured at Gloucester, N. J. When the manufacture was first attempted in the United States, the officers of the Welsbach Company sent out letters in every direction for minerals containing the metals they wanted. They had to experiment some time before they really made much headway; then they concentrated on one or two minerals—one known as monazite. Then the problem: Where can this mineral be found in sufficient quantities to enable the company to supply the growing demand for their manufacture? At first they met with very moderate success—perhaps some people would have pronounced it failure. But they kept on; and now they can purchase all the monazite they require, either from North and South Carolina, or Brazil, with small quantities now and then from other localities.

A number of years ago Mr. Thomas A. Edison wanted one or two rare minerals for his purposes. At first they could not be supplied satisfactorily; but, as the demand grew, the product increased, and now the tip of every phonograph receiver has a sapphire point, and the mineral itself is supplied at fabulously low prices. A party in France wanted zircon for their establishment, and it seemed at first that they never could obtain enough; but a gentleman in North Carolina mined and shipped them 600 pounds, a larger quantity than had ever before been found, and an abundant supply for their purposes. But the uses of zircon have since multiplied. The product has multiplied also, and now it is not an unusual thing to hear of a whole carload of this once rare mineral being shipped.

Returning to monazite—which is a mineral containing cerium, didymium, erbium, lanthanum, thorium and yttrium. Here are rare metals, varying in price from \$10 to \$360 a pound. If any of them should be found wholly efficient in destroying any species of bacteria, there is no doubt that the metal would be forthcoming in any quantity necessary to meet the demand of the medical world. As proof of this I am now mining and shipping to Europe many thousands of pounds of the mineral from which these metals are derived, and have no fear that I shall not be able to fill any order which comes along not exceeding a thousand tons.

Other very rare metals exist in monazite, and also in samarskite—in the latter such rare species as columbium, terbium, decipium, tantalum, argon and helium, some of which are possibly entirely unknown practically to many chemists, as well as those engaged in other sciences.

Euxenite, another very rare mineral, also contains rare metals, such as germanium and uranium, as well as argon and helium. Antidotes of the poisons of these various bacilli cannot be said to have no existence until these various metals have been tried. Then arises another difficulty, to be swept away, if possible—the use of a metal to destroy certain micro-organisms, and the metal itself to be non-injurious to the human body. That this will lead to much experimenting, there is no doubt; but, of course, none of the first experiments should be made on human beings, no matter how aggravated the case.

Referring again to euxenite, samarskite, and the element helium, derived therefrom, when helium has been utilized to produce arti-

ficial sunlight—for the sun contains helium—then we will have a light to experiment with far in advance of the electric bulb now placed in the human stomach for the purpose of clinical and other observations; and when helium is put into further practical use, we will also have something to work by in our laboratories that will be akin to sunlight, and thus save many a sweltering and many a headache now caused by modern artificial lights.

Acting upon the discoveries of Dr. Meade Bolton, the searcher for that which will lengthen human life by destroying disease will most likely be guided by the cue, given by the doctor, that the metals most readily attacked by chemical reagents are most effective in the destruction of microbial life. A comparatively short investigation will enable the student or the searcher after this knowledge to make a list of the metals required. Possibly, most of the metals on the list can be obtained at once and with little difficulty. But when the others are desired I would suggest that they be sought through parties skilled in obtaining them, either in the United States or abroad, and I believe it is now conceded that every known mineral and metal has been found in the United States, and by far the largest number in Virginia, North Carolina, western South Carolina, Georgia, Alabama and eastern Tennessee. Only a short time ago, in an area of less than five square miles, I found and classified 138 species of minerals, more than half of them of the rarer varieties. I believe it is possible to make even a longer list, and that the locality I refer to is not the only place in the United States where so many can be found.

It is quite evident, then, that when an antidote is found, the mineral will be forthcoming in ample quantities to make the antidote effective and widespread.

It seems to the writer that all these medicinal elements for the restoration to health of bacteria-troubled patients is right in the line of advanced pharmacy. Being in that line, why ought not the pharmacists of this country to be first to make efforts in the way where they will naturally travel ere long? I shall watch with keen interest any steps taken by the pharmaceutical world in the direction pointed out in this article.

HARRISBURG, PA., September 12, 1895.

REPORT ON TANNIN FROM AN EXUDATION OF *PTEROCARPUS DRACO*, LINNÉ,¹ AND KNOWN IN JAMAICA — AS DRAGON'S BLOOD.

BY HENRY TRIMBLE.

The origin of this product was described in the *Bulletin of the Botanical Department*, Jamaica, No. 45, July, 1893.² As there stated the tree is about thirty feet high, and when an incision is made in the bark, drops of red sap ooze out, which flow slowly down the bark and gradually harden.

The sample received by me from Mr. Fawcett was in small garnet-red pieces, transparent at the edges, and breaking with a resinous fracture. It much resembled the eucalyptus kino received from Australia.

On account of its solubility in water the product closely resembled some other varieties of kino, as well as the one just mentioned from Australia.

Warm water dissolved 95.95 per cent. of it; the insoluble portion, 4.05 per cent., consisted chiefly of adhering bark fibre.

The ash amounted to 2.36 per cent., and was found to consist of potassium, calcium, magnesium, and sulphuric, carbonic and phosphoric acids. There were found 34.85 per cent. of tannin and 25.40 per cent. of moisture, which would indicate 46.71 per cent. of tannin in the absolutely dry substance. The balance consisted chiefly of gum. A complete statement, therefore, might be made as follows :

	Per Cent.
Tannin	34.85
Moisture	25.40
Ash	2.36
Insoluble	4.05
Gum, etc.	33.34
	<hr/>
	100.00

The tannin was separated from the gum with great difficulty, because of the ready solubility of each in water, and because the tannin caused some of the gum to go into solution in absolute alcohol, and also in a mixture of alcohol and ether. Agitation of the water

¹ From the *Bulletin of the Botanical Department*, Jamaica, Vol. 11, p. 161.

² A history of this substance was given by Flückiger, *Pharmaceutical Journal*, 1893, p. 108, and *Am. Jour. Pharm.*, 1893, p. 460.

solution with acetic ether, even in the presence of salt, did not serve to separate the tannin from the gum, as the latter substance seemed to withhold the former. The close association of the two principles was finally broken up to some extent by agitation of the coarsely powdered sample with sand and acetone. Upon allowing the mixture to rest, the gum separated as a jelly-like mass. The acetone solution when separated, and the solvent recovered by distillation, left the tannin in a porous condition, but still admixed with some gum. From this residue the greater part of the still adhering gum was separated by treatment with absolute alcohol. The solution was filtered from the gum left undissolved by that solvent and distilled to dryness, and the residue rendered porous by solution in a mixture of alcohol and ether and subsequent rapid vaporization of those solvents by distillation under reduced pressure.

The ultimate composition of the pure tannin will be seen by the following average of three analyses :

	Per Cent.
Carbon	58.91
Hydrogen	4.80
Oxygen	36.29
	<hr/>
	100.00

An aqueous solution of the tannin gave the following reactions :

- Lime water Purplish-pink color, becoming a brownish ppt.
- Bromine water Yellow ppt.
- Ferric chloride Green ppt. and color.

The composition, as well as the reactions, indicate it to be very closely related to oak bark tannin, if not identical with it. The sample does not agree in composition or properties with the dragon's blood from the East Indies ; it does, however, closely resemble the kinos, and should more properly be classed with them.

It will, no doubt, if found in sufficient quantity, have some use in medicine as a kino, and it might be used, in case its price should warrant it, in the manufacture of leather, although such substances containing gum usually make a soft product.

ABSTRACTS FROM THESES.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 147.

KOLA.

Nathan L. Thompson, Ph.G., estimated the total alkaloids and the tannin of some specimens of this drug which he obtained in commerce. He applied three methods for extracting the alkaloids. In the first, these principles were extracted from the powdered or finely chopped nuts by maceration with chloroform, purified by treatment with acidulated water and removed from the liquid, which was filtered from the greenish-yellow fatty substance that separated, by rendering it alkaline with sodium hydrate and agitating it with chloroform. The second method consisted in exhausting the drug with 2 per cent. hydrochloric acid, and, after making alkaline with sodium hydrate, removing the alkaloids with chloroform. Lloyd's process with ferric hydrate was employed as the third means of estimation. The crystals of the alkaloids

Specimen.	Condition.	Moisture.	Ash.	Tannin in	
				Original Drug.	Absolutely Dry Drug.
1	Dry	7'55	3'19	1'73	1'87
2	"	6'95	2'20	1'73	1'86
3	Fresh	56'65	3'66	1'24	2'85
4	Partly dried	38'50	3'66	1'52	2'47

TOTAL ALKALOIDS.

Means of Extraction.	Specimen.							
	Original Drug.				Absolutely Dry Drug.			
	1	2	3	4	1	2	3	4
Chloroform	1'00	'55	'80	'75	1'08	'59	1'84	1'22
Acidulated water	1'35	'75	'85	1'00	1'46	'80	1'96	1'62
Lloyd's process	1'35	—	'75	—	1'46	—	1'73	—

which were weighed in these estimations were pure white in color. The tannin was estimated by the gelatin and alum method. The results are given in percentages on the preceding page.

FLUID EXTRACT OF CUBEB.

Percy Hyers, Ph.G., determined the total solids, oil and fatty matter and resin contained in some samples of this preparation which he purchased in the market. The total solids were estimated by evaporating a known weight. An examination of the residues proved the absence of glycerin. To separate and estimate the oil and fatty matter, a quantity of the fluid extract was diluted with five volumes of acidulated water, and this mixture shaken with several successive portions of petroleum ether. After this treatment the mixture was agitated with ether to remove the resin. He also prepared a fluid extract in strict accordance with the official directions, and examined it in the same manner. The results were the following percentages :

	Total Solids.	Color of Residue.	Oil and Fatty Matter.	Resin.
1	15.30	Brownish-green	11.92	4.22
2	14.30	Green	7.86	3.98
3	13.85	Dark brown	7.60	4.06
4	11.97	"	8.90	4.08
Own	20.85	"	13.70	4.40

The author found that ether extracted 22.45 per cent.; acetone, 18.48 per cent.; alcohol, 14.48 per cent., and petroleum ether, 13.47 per cent. of the weight of the drug. After complete exhaustion with acetone, the drug residue yielded less than 1 per cent. of extractive to alcohol.

GINGER.

Robert G. Davis, Ph.G., estimated the amount of the oleoresin that could be obtained from the commercial varieties of ginger by the use of the official process for the preparation of that article. The following table states the results obtained, and also the percentages of moisture and ash present in the samples :

Variety.	Form.	Condition.	Oleoresin.	Moisture.	Ash.
Jamaica.	Root.	Bleached.	4.62	12.10	5.25
"	"	"	4.53	10.40	5.25
"	"	Unbleached.	2.82	12.50	3.50
"	"	"	4.41	9.85	3.65
"	Powder.	"	4.30	9.05	5.20
"	"	Bleached.	4.84	9.70	6.55
Race.	"	—	4.09	11.10	5.35
"	"	—	5.40	9.15	5.05
"	Root.	—	4.02	12.20	5.60
African.	"	—	5.75	13.65	4.65
"	Powder.	—	6.27	12.60	4.65
Jamaica.	"	—	3.73	12.15	3.65

SAMBUCUS CANADENSIS.

C. Otto Moosbrugger, Ph.G., made a chemical investigation of the bark of this member of the Caprifoliaceæ, whose flowers are official. The bark is said to be used as a poultice for "foot rot" in cattle. When subjected to analysis it was found to contain :

	Per Cent.
Fat and wax	1.34
Crystallizable resin and chlorophyll	1.78
Substances extracted by absolute alcohol	2.38
Mucilage	2.16
Glucose	2.12
Saccharose, dextrin and other substances dissolved by water	2.86
Pectin and albuminous compounds	6.92
Pararabin compounds	2.36
Lignin	7.86
Moisture	6.83
Ash	5.75
Undetermined organic matter	57.64

100.00

Tannin, starch, alkaloids and glucosides were not present.

YUCCA FILAMENTOSA.

Max Morris, Ph.G., having heard that a tincture of the root of this plant, which is called "bear grass" in the southern part of the United States, had been used internally in the treatment of rheumatism, decided to investigate the drug chemically. He accordingly collected some of the root near Macon, Ga., and subjected it to a proximate analysis. Wax, fat and caoutchouc were found to constitute the petroleum ether extract. Ether removed a small amount of a resin which gave, with ferric chloride, a brown precipitate, and with lead acetate a brownish-white precipitate. Absolute alcohol

dissolved 5.15 per cent. of substances, which were almost altogether soluble in water. This included 1.70 per cent. of saponin. Water extracted 38.68 per cent. of organic solids, including 4 per cent. of mucilage and albuminoids, 7.65 per cent. of glucose, and 3.5 per cent. of saccharose. A dilute solution of sodium hydrate removed 4.04 per cent. of mucilaginous and albuminous substances. Moisture was present in the air-dry root to the extent of 6.12 per cent., and 5.79 per cent. of ash was left upon incinerating it. No evidence of the presence of alkaloids nor of tannin was obtained.

SIAM GAMBOGE.¹

The tree yielding Siam gamboge (*Garcinia Hanburii*, Hook. f.) is closely related to *G. Morella*, Desrouss., of Ceylon and Southern India. The former is a moderately large tree. The flowers are dioecious, the petals in both male and female flowers are fleshy and yellow. The fruit is the size of a crab-apple, yellowish green when ripe. The tree is found on islands on the east coast of the Gulf of Siam, as well as on the mainland of Cambodia and Cochin China. It is from these localities that practically the whole of the gamboge of commerce is obtained.

Gamboge is a gum resin yielded by the bark of the two species above mentioned. It is a powerful cathartic medicine, but its principal use is as a pigment in water-color painting. It is also used to give color to lacquer varnish for brasswork, etc. The most recent account of Siam gamboge is contained in a report on the trade of Siam for the year 1893, published by the Foreign Office (*Annual Reports*, 1895, No. 1,520). Mr. de Bunsen, Her Majesty's Chargé-d'Affaires at Bangkok, was good enough to communicate to Kew specimens of the leaves of the gamboge trees, collected on the spot by Mr. Beckett, and, although the material is not quite complete, there is little doubt they belong to *Garcinia Hanburii*, Hook. f. The extract from the report is as follows:

"Gamboge is, next to gum benjamin, perhaps, the most interesting of Siamese products. Whilst gum benjamin is peculiar to a small belt of land in the north, gamboge is a resinous product, indigenous only in the islands and the seacoast of the Gulf of Siam lying between the tenth and twelfth degrees of north latitude.²

¹ *Kew Bulletin*, June and July, 1895.

² The heavy rainfall of this coast seems necessary to the existence of the tree.

"I recently had the opportunity of paying a visit to this part of Siam, and it may be of interest to describe the character of the tree and the mode of extracting the resin. The tree is known locally as 'Ton Rong.' It is found only in the islands of Koh Chang, Koh Kong and Koh Rong, and the mainland of the Indo-Chinese peninsula opposite these islands. The trees grow to the height of some fifty feet, and are straight stemmed with no lower branches, owing probably to the dense shade of the forests in which they grow. None of those I saw had a diameter of more than 12 inches. Ten years' growth is said to be required before the tree is ready for tapping. This is carried on by the Cambodian and Siamese islanders in the rainy months, from June to October, when the sap is vigorous, by cutting a spiral line round the trunk from a height of some 10 feet downwards to the ground. Down these grooves the resin wells out of the bark and trickles in a viscous stream into hollow bamboos placed at the base of the tree, and from these it is decanted into smaller bamboos, where it is left for about one month to solidify. To remove the gamboge, the bamboo is placed over a red-hot fire, and the bamboo husk cracking off, there is left an article known as 'pipe' gamboge. The trees can be tapped two or three times during one season, and at the end of the season their trunks present a curious network of intercepting spirals.

Care must be taken to prevent the rain-water mixing with the resin in the grooves, as any mixture of water causes honey-combing and black discoloration, and a consequent depreciation of from 20 to 30 ticals (2*l.*) per picul in value.

The most valuable gamboge is that which is the least honey-combed or discolored, and is all the more difficult to obtain, considering the period of heavy rains during which the resin is extracted.

The bamboos contain on an average rather less than 1 lb. of gamboge, or about 170 bamboos to the picul. The price asked by the pickers themselves is at the rate of 2 ticals (3*s.*) for five bamboos full, and the local price is at the rate of 2 ticals (3*s.*) for three, or 65 ticals (4*l.* 18*s.*) per hundred, or about 8*l.* 7*s.* per picul.

The whole output is sold to local Chinese traders and taken by sailing boat to Bangkok.

SIAM BENZOIN.¹

Benzoin is also known in English commerce as Gum Benjamin. It is a gum resin obtained by incision in the bark of trees in Sumatra and Siam. Benzoin is used as a stimulant and expectorant in chronic bronchitis. It is also one of the principal ingredients in Friar's Balsam, and is largely used for incense. Sumatra benzoin is yielded by *Styrax Benzoin*, Dry., a well-known tree. Plants of this species are under cultivation at Kew, and many have lately been distributed to botanical establishments in the tropics of the New World. Of the tree yielding Siam benzoin we know very little. As long ago as 1865 Sir R. H. Schomburgk, then British Consul at Bangkok, was asked to investigate the subject, but although able to give, at second hand, a very interesting account of the mode of collecting the resin, he was unable to obtain botanical specimens of the tree yielding it. Of late years renewed efforts have been made to solve the problem.

Captain Hicks, of Bangkok, was successful in obtaining a few small plants of "gum benjamin from the Northern Laos States" in 1882. The survivors of these were presented to the Botanic Gardens at Singapore by Mr. Jamie. A fuller account of Captain Hicks' efforts is given by Mr. E. M. Holmes, F.L.S., in the *Pharmaceutical Journal*, XIV, 3, p. 355. The locality from which the plants were obtained was given as "Suang Rabang." This we now know is a misprint for Luang Prabang, a district in the extreme northeast of the Shan States of Siam, bordering on Tran Ninh, in the French territory of Anam. In the hope that the Siam benzoin tree might possibly extend to the Shan States of Burma, an application was addressed by Kew to the India Office in 1889, and as a result a careful inquiry was made by the Government of India, in Tenna-serim, Upper Burma, and the adjoining Shan States. In 1890 it was reported that "the efforts made to trace the existence of the plant in these localities have been unsuccessful."

Apparently, the first authentic information respecting the district in which the tree is to be found is contained in a recent report by Mr. Beckett, forwarded to the foreign office by Mr. de Bunsen on the Trade of Siam for 1893 (Foreign Office, Annual Series, 1895, No. 1520). The following extract shows that Siam benzoin is obtained from an extremely circumscribed locality on the east bank of

¹ *Kew Bulletin*, June and July, 1895.

the river Mekong, in territory now occupied by the French. It is feared that the trade in this article will be ultimately diverted to Tonquin, which is nearer to the source of supply than Bangkok.

"Of gum benjamin, 319 piculs, or nearly 20 tons, figure in the export list, valued at 21,005 dollars, or 2,713 $\frac{1}{2}$ l. This valuable resin is also a product of the east bank of the Mekong, and is interesting as being confined to a narrow zone of forest-clad hill country to the east of Luang Prabang, lying between 19th and 21st degrees of north latitude and longitude east 102 to 105. Some three-fifths finds its way to Bangkok by way of Nan, and the remainder by way of Nongkhai and Korat. The French occupation of Luang Prabang does not seem as yet to have caused any perceptible effect on the Bangkok export of gum benjamin beyond enhancing local prices, but with the completion of new roads, already initiated by the French with a view to speedier communication between Luang Prabang and Tonquin, Bangkok exporters, who are chiefly British, have well-founded fears lest the gum benjamin trade be diverted entirely from Bangkok to Hanoi. The whole of the Bangkok export goes to the London market and thence to France and Belgium, to be manipulated into balsam. A small quantity is used locally for frankincense.

"Prices during 1890 were bad, first-class gum benjamin fetching 125 ticals per picul (or about 165 $\frac{1}{2}$ l per ton); 45 ticals per picul (about 40 $\frac{1}{2}$ l per ton). The good quality known to buyers as 'bold, blocky, almondy,' was scarce."¹

As the result of independent inquiry made at the instance of Kew by the India Office, the following further information has been received. This was obtained through the Siamese Minister of the Interior at Bangkok. It affords, therefore, an account of Siam benzoin from the purely native point of view. All the accounts agree in ascribing the region of the benzoin trees to the left bank of the Mekong River, in what is now French territory. This is a tract of upland country east and northeast of the important town of Luang Prabang:

INDIA OFFICE TO ROYAL GARDENS, KEW.

INDIA OFFICE, WHITEHALL, LONDON, S. W.

July 30, 1895.

SIR:—In continuance of previous correspondence, I am directed

¹ The remainder of this article is taken from a continuation in the *Kew Bulletin* for August.

by the Secretary of State for India to forward herewith for your information a copy of a letter, and its enclosure, regarding the tree producing Siam benzoin. It is suggested that the memorandum on the Siam benzoin may be found suitable for publication in the *Kew Bulletin*.
I am, etc.,

(Signed)

A. N. WOLLASTON.

The Director,

Assistant Secretary,

Royal Gardens, Kew.

Revenue and Statistics Department.

No. 606.—2 F.—7, dated Rangoon, May 30, 1895.

From the Revenue Secretary to the Chief Commissioner of Burma.

To the Secretary to the Government of India, Revenue and Agricultural Department.

With reference to the correspondence concerning the steps taken with the view of identifying the plant or tree which produces the resin known as "Siam benzoin," I am directed to submit, for the information of the Government of India, a copy of a memorandum regarding the tree that produces this resin, and on the gum benjamin industry in Siam, prepared in Bangkok under the orders of the Siamese Minister of the Interior, and forwarded to the Chief Commissioner by Mr. J. G. Scott, in April, 1894. * * *

Mr. Scott stated that the area in which the gum benjamin trees were found was said to be all on the left bank of the Mekong, and, therefore, in what is now French territory. * * *

Mr. Scott further remarked: "The great Siam benzoin tract is Hna Pan Htang, Ha Htang Hôk, the upland country east and northeast of Luang Prabang. * * *

MEMORANDUM REGARDING THE TREE THAT PRODUCES RESIN, AND ON
THE GUM BENJAMIN INDUSTRY IN SIAM.

The gum benjamin tree is large and tall, and has a heart similar to that of the "teng rang" (a species of *Shorea*) and "phayom" (a kind of mahogany). In its general character, and in the form of its leaves, it resembles the "takieu" tree (a forest tree of hard wood, used for making dug-out boats). The gum benjamin tree is propagated from the original fruit. This, when fallen and lying upon the ground, takes root and sprouts after the fashion of the "phayom" and "gang" trees. As regards the trunk of the gum benjamin tree, there is no one who uses it. Gum benjamin trees are generally

found on elevated ground and do not like the plains country. They grow in isolated patches, like the forests of "teng-rang" and teak. A forest patch of gum benjamin usually contains from fifty to sixty trees and upwards, and the tree is found generally in large numbers along the high hills in the extensive forest region of Slua Phan, Tangslok, and the borders of Müang Theng in the province of Luang Prabang. It is rarely met with in other countries, except those outside the provinces immediately contiguous to Siam. The Siamese Thai, Annamites and Tongsoos, who have settled in the above-mentioned provinces, have worked out and traded in the gum benjamin from an early period for successive generations, and these are scattered amongst the neighboring people, as well as being frequently found in Siam also. The season for working the gum benjamin is from the eighth or ninth months (July and August) to the tenth and twelfth months (September and November), when the season ends. Thenceforward is the period during which the gum benjamin is bought and sold. The gum benjamin is worked after the following methods: So many trees are notched, so as to form a girdle around the stem. An interval of three months is allowed to elapse between the period of notching and that of picking the gum benjamin dammar, which wells out of the trunk and collects in the notches. By means of a sharpened stick or the point of a knife this is picked out, bark and all, and gathered at once in baskets. It is then sorted and divided into different classes, according to choice. Picking cannot commence before the interval of three months has elapsed, as the dammar that has trickled out into the notches would not have had time to harden. It would still be soft and sticky, and if picked at the time would become dirty, owing to the bark coming off with it; nor would it be of such value either, as, being sticky, it would cling to other things and the full benefit would not be derived, such as would be the case if it were properly dry. For this reason the gum benjamin must be left for three months after the notching, in order that all the gum possible may well out, and it may become dry and hard. Among the people above-mentioned the picking and sale of gum benjamin is generally considered as one way of obtaining a livelihood, for the gum has a value and is reckoned as a marketable commodity. And even if the people have no other occupation than selling gum benjamin, that by itself is sufficient as a means of livelihood. The period during which the

gum benjamin is sold is not necessarily confined to the eighth or ninth months. The reason for selecting that season is because the people of those parts have many other things to do; for instance, they have to plow the fields and reap their rice harvest. In the eighth and ninth months their work on the paddy fields is finished, and they can therefore turn their attention to gum benjamin. For this reason there is a special season. Their paddy fields are their first care, and then the gum benjamin trade. Those who have no business with plowing paddy fields and planting rice can, if they wish, work continuously at gum benjamin, at all seasons and during every month of the year. The gum benjamin trade requires no very great outlay of capital. All the implements required are one large axe, a rice basket and an open woven basket. If a person wishes to work alone, without servants to assist him, he can do so; for in the first stages there is nothing much that requires to be lifted or carried. The only labor necessary would be when the gum benjamin is being picked and placed in baskets, and has to be carried to the temporary or permanent home of the picker. The profits gained on any one particular occasion or another can hardly be gauged accurately. Those who work out much sell at a large profit; those who work out little sell at smaller profit. One catty ($133\frac{1}{3}$ pounds) and upwards would be considered a large output. Picked gum benjamin is sorted into three classes. The best class, and that which fetches a high price, is called "slua," and is that which is sold in large lumps, and is not dirtied by the presence of bark. The second class is that left over from the first class, and is in somewhat smaller lumps than the latter, and has some, but not much, bark attached to it. This is inferior in quality to Class I, and is half the value. That is to say, if Class I is sold at 75 ticals, Class II would sell at $37\frac{1}{2}$ ticals. The third class is that left over from Class II. This class has bark attached to it, is soiled with dust and dirt, and is in small, fine pieces. It is called "mun," and is half the value of Class II. The price of gum benjamin, as sold in the jungle districts where the gum is worked, is as follows: Class I, one Chinese catty ($66\frac{2}{3}$ pounds), 100 or about 75 ticals. Class II, half the price of Class I. Class III, half the price of Class II. The price in Bangkok is: Class I, one Chinese catty, 260 ticals, as it has always been.

The gum benjamin trees that grow in the jungle districts referred to are not the subject of disputed ownership by one person more

than another. Any one who wishes to work gum benjamin has merely to go into the jungle, search for and notch as many trees as he pleases, like people, for example, who go into the jungle to cut posts for their houses. Nor is there any tax or other emolument accruing to the country from either the trunk or the gum of the gum benjamin tree; nor is the gum benjamin trade one in the prosecution of which much thieving or fighting arises, whether it is because there are many people together at a time, or because, being in the jungle where there are fierce tigers, one man cannot steal along alone by himself, but is obliged to travel with parties, and so robbery and theft are rendered impossible, is uncertain. This gum is sweet-scented, and is much used in mixing either with medicines or scents of various kinds. For whichever of these purposes it is sold, it always fetches a high price, like other valuable commodities, and for that reason gum benjamin is an article of commerce which merchants have bought and sold from time immemorial to the present day.

THE ACTION OF HEAT UPON THE ALKALOIDS OF IPECACUANHA.¹—

BY DR. B. H. PAUL AND A. J. COWNLEY.

Experiments carried out by Braithwaite and Umney, as well as some previous observations by Cripps, showed that by heating the acetic acid extract of ipecacuanha some considerable loss of alkaloid resulted. Hence it was inferred that the official B. P. process for preparing ipecacuanha wine is open to objection, since the extract obtained in that way requires to be heated for several hours on a water bath before it can be reduced to powder as directed.

At the time these experiments were made the existence of two distinct alkaloids in ipecacuanha root had not been ascertained, and the question arose whether the observed loss of alkaloid applied to both emetine and cephaeline, or only to one of these alkaloids.

From our own observations we were of opinion that the salts of these alkaloids do not suffer alteration when heated to a temperature of 100° C., but it seemed desirable to obtain some further information on this point, and also to ascertain whether the loss of alkaloid observed in making ipecacuanha wine is due to the altera-

¹*Pharmaceutical Journal* (4), 1, 2.

tion of emetine or of cephaeline. With that object the following experiments were made with the pure alkaloids :

A solution of .0968 gramme emetine in 53 minims strong hydrochloric acid, diluted with two fluid ounces of water, was evaporated, and the dry residue heated for sixteen hours upon a water bath. At the end of that time the residue was but very slightly colored, and was found to contain .09512 gramme of alkaloid, a difference from the quantity taken not greater than may be ascribed to experimental error.

In a similar experiment with .09504 gramme cephaeline a like result was obtained, the quantity of alkaloid found in the residue after evaporation being .09328 gramme.

The effect of long-continued boiling (sixteen hours) of solutions of emetine and cephaeline containing excess of acetic acid was then tried. In both instances there was but little alteration in the color of the solutions, and the quantity of alkaloid afterwards extracted was almost the same as that originally taken for the treatment.

Under both of these conditions there appears to be very little alteration of either emetine or cephaeline. The result is, however, very different when solutions of either of these alkaloids in acetic acid are evaporated, and the dry residue is heated for some length of time. In that case the solution becomes colored as the evaporation advances, and the dry residue has a dark brown color, which is more marked with cephaeline. The residues left on evaporating acetic solutions of the alkaloids have an alkaline reaction, from which it would appear that the acetates are decomposed by heating, and that the alteration of the alkaloids is due to the action of heat upon them in the free state. An experiment made to ascertain this point, by heating cephaeline moistened with water in an open basin, and keeping the dry residue hot on a water bath for sixteen hours, showed that, under these conditions, there was a loss of alkaloid amounting to 17.6 per cent., with considerable darkening. On dissolving the residue in hydrochloric acid, adding ammonia, and shaking out with ether, only a few crystals were obtained, and the ammoniacal liquor presented a marked fluorescent appearance.

To ascertain more exactly the extent to which each of the two different alkaloids of ipecacuanha is altered when the dry residue of an acetic solution is exposed to heat, the following experiments were made :

A solution containing 0.09698 gramme emetine in 85 minims of acetic acid, diluted with 2 fluidounces of water, was evaporated to dryness in an open basin on a water bath, and the dry residue kept at the same temperature for 16 hours. The quantity of alkaloid was then determined by dissolving the residue with hydrochloric acid, adding ammonia and shaking out with chloroform, then titrating the residue from the chloroform solution; it amounted to 0.07087 gramme, showing a loss of .02611, or nearly 27 per cent. of the alkaloid operated upon.

In a similar experiment with .09504 gramme cephaeline, the quantity of alkaloid found in the residue was .07392, showing a loss of .02112, or upwards of 22 per cent.

In both cases there was evident alteration of the alkaloids. The residues left by the acetic solutions after evaporation were very dark colored. That obtained from cephaeline no longer gave the characteristic crystallization when shaken with ether and ammonia, and the alkaline liquor was highly colored as well as fluorescent.

In order to further test the influence of heat in altering the alkaloid contained in ipecacuanha, the emetic action of the residue obtained by heating cephaeline with excess of acetic acid was tried, and it was found that a dose of .01 gramme produced no emesis in 30 minutes.

The alteration above mentioned does not appear to be merely the result of heating, for when cephaeline was heated to its melting point for 13 hours in a partially closed vessel, there was practically no alteration of alkaloid beyond a very slight loss of weight, which might be ascribed to the presence of some adherent ether or moisture. This result seemed to point to the fact that presence of air is necessary for effecting the alteration observed when the alkaloid is heated in an open basin.

CHEMICAL LABORATORY,

13 FENCHURCH AVENUE, E. C.

NOTES ON CURING CACAO.

BY W. CRADWICK, Superintendent of Hope Gardens.

The following instructions to those who grow cacao on a small scale have been issued by the Department of Public Gardens and Plantations, Jamaica, and appeared in the *Bulletin* of that department for July, 1895 :

The first important point to be observed when about to cure cacao is that it must be quite ripe, but not over-ripe. The pods must have attained their full color, whatever it may be, but if the beans shake about easily then the pod is over-ripe. The reason is, that if the beans are not ripe, the mucilaginous matter covering the beans is not properly developed into the stage when it will readily ferment. If left to get over-ripe, the mucilage commences to liquify.

The best vessel in which a small cultivator can ferment cacao is an ordinary flour barrel. To prepare this for the reception of cacao beans, first bore about a dozen holes, each a half an inch in diameter, in the bottom of the barrel; then place about ten inches of banana trash in the bottom of the barrel. Line the sides also thickly with trash, and have a sufficient quantity on hand to cover the beans when placed in the barrel. When the barrel is ready, break the whole of the pods and place the beans in the barrel, covering with the banana trash. The beans must be left to ferment for two days, then remove one-third of the beans, lay them in a heap on the floor, and mix them thoroughly. Remove the balance of the beans, and mix them also, but do not put the two heaps together. After placing fresh trash in the barrel, put the beans which were at the top back into the bottom of the barrel, and those which were at the bottom, place at the top. Cover with the trash in the same way as before, and leave for two more days, when the beans should be treated in exactly the same way as before. They should then be left for two more days, when they should be taken out and washed thoroughly.

On the day the beans are finally removed from the barrel the work should be commenced very early in the morning, so as to get all the sun possible on the first day, for the beans mildew very quickly. They should be washed immediately after they are taken out of the barrel, as this helps to keep them plump.

The proper amount of cacao to ferment in one barrel is the quantity of beans obtained from 1,000 ordinary sized pods. If many more than this number are put into one barrel the fermentation is too great, and the beans turn black.

If a less quantity, say, below 700 pods, is to be fermented, the green trash and more of it must be used, and a weight not exceeding 28 pounds placed on top, which helps the fermentation. During the time of drying the cacao it is not desirable to expose it after the

first two days to the extreme heat of the midday sun; it is better to take it in about nine o'clock, and then put it out again between three and four o'clock. Those who use the evaporators are warned against an excessively high temperature.

Great care must be taken when removing the pods from the trees that they be cut off with a good, sharp knife, not pulled off. If pulled off, the little knob at the base of the stem of the pod is injured, and the tree will not bear from the same spot the following year. If the pods are cut off carefully, the tree goes on bearing from the same spot year after year.

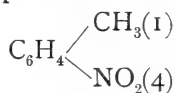
NOTE ON SINALBIN MUSTARD OIL.—

BY L. E. SAYRE.

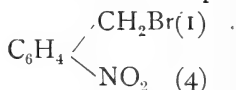
Since writing the article on "A Review of the Constituents of White and Black Mustard Seed," published in the July number of this *Journal*, Prof. J. U. Lloyd has called my attention to an article by H. Salkowski, in *Berichte d. deutsch. chem. Ges.*, 1889, vol. 22, p. 2137, in which it is stated that the acid which Will and Laubheimer obtained from sinalbin, and pronounced to be the *ortho* oxyphenylacetic acid, has none of the properties of either *ortho* or *meta* oxyphenylacetic acid, but seems to be identical with the para-acid. H. Salkowski manufactured the sinalbin mustard oil by treating para-oxybenzylamin with CS_2 , and the resulting product with HgCl_2 . The sinalbin mustard oil thus obtained has a burning taste, and produces blisters on the skin; is soluble in dilute alkali, but insoluble in water. It only slightly volatilizes with steam.

This being the case, I desire to change the possible reactions leading to a synthetized preparation, as published in the article referred to, as follows:

(1) Beginning with the para-nitro-toluidene



add bromine and heat to 130° to 160° in a sealed tube until the reaction is completed. The result will be para-nitro-benzyl bromide



Treat this with a reducing agent ($\text{Zn} + \text{HCl}$). The result will be *ortho*-amido-benzyl bromide, etc. See *Amer. Jour. Pharm.*, July, p. 345.

THE ALKALOIDAL VALUE OF IPECAC STEMS.

BY ALFRED R. L. DOHME.

Presented to the American Pharmaceutical Association, Denver Meeting, 1895.

In previous experiments it has been shown that the cork cells and those of the cortical parenchyma adjacent to them are the seat of the alkaloids of ipecac root. Furthermore it has been shown that the thinner root contains more alkaloid than the thicker or fancy root.

Since then it has been observed by the writer that what he termed "wiry" root is made up of two parts of the plant, viz.: the stem proper and the part of the plant that merges the root into the stem. While the stems are usually quite straight, with a smooth surface, the part that merges it into the root is almost invariably twisted and slightly annulated. This then divided the ipecac root of commerce into three varieties, *root*, *merging portion* and *stems*, which shall here be designated respectively as fancy root, wiry root, and stems.

Two lots, "A" and "B," of commercial ipecac root were spread out separately, and each divided up into three portions representing "fancy root," "stems," and the "merging portions." All six portions were assayed by Keller's method, using titration with volumetric acid solution, and with the following results :

Ipecac Root, Sample "A."

Fancy root	2.00	per cent. alkaloids.
Wiry root	2.13	" "
Stems	1.77	" "

Ipecac Root, Sample "B."

Fancy root	2.33	per cent. alkaloids.
Wiry root	2.43	" "
Stems	2.15	" "

From these results but one conclusion can be drawn, and that is that the wiry root, as was shown last year, is richer in alkaloid than the fancy root, and that the stems contain less alkaloid than either the fancy or wiry root, but still contain considerable alkaloid.

BALTIMORE, June 25, 1895.

ASSAY OF WILD CHERRY BARK. —

BY A. B. STEVENS, PH.C., AND J. N. JUDY, PH.C.

Presented to the American Pharmaceutical Association, Denver Meeting, 1895.

QUERY NO. I.—“Is the thin, green wild cherry bark really more valuable therapeutically than the older and thicker bark?” Make comparative assays.

The therapeutic value of the bark depends upon the amount of the active principles within the bark. This principle is a glucoside, identical with or closely allied to amygdalin. Therefore, the query can be answered only by a comparison of the results obtained by the assays requested.

The thick bark occurs in the market in slightly curved or arched pieces of various sizes, the length being about 25 to 80 mm., and the breadth 13.5 to 50 mm. The thickness of the pieces which consist entirely (or nearly so) of the inner bark is about 3.15 to 4.16 mm. In cases where the outer portion of the bark is attached it is nearly or quite 6 mm. thick.

The thin bark has the principal characteristics of the thick bark, such as odor, fracture and color, which may vary somewhat, also differing in thickness, being about 2 to 2.8 mm. thick. It is also found in the market in somewhat smaller fragments than the thick bark.

Both the thick and thin barks vary in color and other external characteristics according to the size of the pieces, and the presence or absence of the periderm, etc. When the periderm is attached, the pieces are of rougher character, and in such parts of the bark the color is redder, and somewhat spotted at intervals with irregular grayish silver-white or brownish patches. Some of the smaller pieces, particularly the thin bark, presents a uniform reddish-yellow appearance, and is nearly smooth externally. Internally the bark has a deep yellowish or reddish-brown color, the color of the thick bark being the more intense. On the inner surface of the bark occasional portions of wood are found. The longitudinal fracture is close and presents a rough surface of a yellowish-gray color interspersed with reddish spots and stripes. The transverse fracture is close, somewhat rough and fibrous, and of a redder hue than the longitudinal. The texture of the bark is somewhat spongy, particularly the inner layers.

Carefully selected samples of each variety were obtained and the wood and outside rough portions removed, after which the bark was

ground into fine powder and each sample placed in a glass-stoppered bottle.

The method of estimation was based upon the conversion of the glucoside into hydrocyanic acid and a volatile oil; second, upon the distillation of the hydrocyanic acid to separate it from the bark; and third, upon the estimation of the hydrocyanic acid. Two methods were used. The details of the operations are as follows:

First method.—Ten grammes of the drug were placed in a small flask, about 100 c.c. of water were added, corked tightly, macerated for twelve hours, and connected with a large condenser. A moderate heat was then applied and the distillate conducted into a solution of potassium hydroxide, the distillation being continued almost to dryness. About 150 c.c. more of distilled water were added through a glass-stoppered thistle tube, and distillation continued as before. This operation was repeated not less than four times to secure the absolute removal of all the hydrocyanic acid from the drug, after which the condenser was thoroughly rinsed to remove any adhering hydrocyanic acid. The amount of acid was then estimated volumetrically, by titrating the slightly alkaline solution of potassium cyanide with decinormal silver nitrate solution.

The second method of estimation was as follows: The drug was macerated and distillation continued as in the first method, but this time the distillate was conducted into a solution of silver nitrate. An insoluble silver cyanide was formed. The precipitate was allowed to settle, the supernatant liquid decanted through small counterpoised filters, the precipitate transferred to the filter, washed, dried and weighed.

The glucoside was estimated without decomposition, as follows:

Five grammes of the drug were placed in a Soxhlet's apparatus, extracted with absolute alcohol for six hours, and the alcoholic extract evaporated to a syrupy consistence. An excess of ether was added, precipitating all the glucoside, together with some coloring matter and resin. The precipitate was washed with ether, on the filter, and treated for a short time with 100 c.c. of boiling distilled water. The solution was allowed to cool. The glucoside in solution was filtered, the filter washed with a little hot water, and the washings and filtrate mixed. The solution was evaporated to dryness in a weighed porcelain dish, and again weighed; the increase in weight represented the glucoside.

In order to test the accuracy of the above method, and to ascertain the number of distillations necessary to obtain all of the acid, the distillates were collected separately, and the acid in each estimated with the following results:

First distillate	17.15 per cent. hydrocyanic acid.
Second "	11.2 " " "
Third "	5.25 " " "
Fourth "	1.05 " " "
Fifth "	0.00 " " "

To verify the above, a number of experiments were made by adding a known quantity of hydrocyanic acid to previously exhausted bark and to other drugs like cinnamon. These were subjected to distillation under exactly the same conditions as in the preceding case, with the following results:

First distillate	56.0 per cent. of total acid added.
Second "	32.0 " " "
Third "	8.0 " " "
Fourth "	2.8 " " "
Fifth "	0.0 " " "

In no case could all of the hydrocyanic acid which was mixed with the powder be recovered. The loss was about 1 per cent.

ASSAY OF BARK.

Average results of several estimations upon each sample of the bark:

Thick Bark.

First method, No. 1,	0.035 per cent. of hydrocyanic acid.
" " 2,	0.35 " " "
" " 3,	0.34 " " "
" " 4,	0.323 " " "
" " 5,	0.348 " " "
Second method, " 1,	0.319 " " "
" " 2,	0.323 " " "

Thin Bark.

First method, No. 1,	0.24 per cent. of hydrocyanic acid.
" " 2,	0.264 " " "
" " 3,	0.27 " " "
" " 4,	0.268 " " "
Second method, " 1,	0.229 " " "
" " 2,	0.238 " " "

Yield of amygdalin (or allied substance):

Thick bark, average 4.12 per cent.

Thin bark, average 3.16 per cent.

Of the two methods given for the estimation of the acid, the first is the more accurate and satisfactory. Much care is required in manipulating the precipitate of silver cyanide in the second.

The yield of hydrocyanic acid as above stated is more than twice that previously reported. J. S. Perot (AM. JOUR. PH., Vol. 24, 1852, page 111) found from 0.0478 to 0.1436 per cent. We believe that the result is due to the improved method of estimation, as numerous experiments proved that only about half of the acid was obtained during the first distillation.

The above results appear to furnish to the query a negative answer.

ANN ARBOR, MICH, June 15, 1895.

THE FUTURE OF THE TURPENTINE INDUSTRY.

In a communication to *Garden and Forest* of July 10, 1895, L. J. Vance gives his opinions of the "Future of the Long-leaf Pine Belt," and as this is intimately connected with the turpentine industry, we reproduce it as follows:

A few weeks ago, when I was in the pine district of the South, every evening the sky was illumined by a dull red glare, and in the daytime the horizon was obscured by a thin veil of smoky haze. The cause of this was the turpentine industry, which has now reached its busiest season.

Few people who have not been in what is called "the long-leaf pine belt" of the South can have any real idea of the extent of the damage done to the country by the turpentine workers and by the lumbermen, both of whom conduct their business on what has been bluntly called "the robbing system." They have left immense areas of land robbed not only of its natural resources, but in a worse condition for clearing and culture than before their invasion. Such is, without doubt, the case of many square miles in the two Carolinas, in Georgia, in Alabama and in Louisiana.

The result is that the most bare and barren places in all the South are those that have been visited by the army of turpentine gatherers. Every Northern visitor familiar with well-ordered and cultivated farm lands and houses is struck by the great tracts of Southern country on which there is no vegetation of any value. These wastes are deserted and uninhabited, except here and there by the negro's lonely cabin.

The loss from fires is enormous. The turpentine workers are so careless and indifferent as to allow fires to run through the tracts in which they have worked. The resin on the scarified surface of the trees burns like kerosene; a spark, a blaze, and all at once a disastrous conflagration is sweeping through the pine forests with great fury, destroying millions of feet of marketable timber, and leaving hundreds of acres a scene of awful ruin.

This is no highly-colored story, but a plain statement of what has been going on in the pine belt for years. Now and then protests have been raised against the reckless manner in which these forests are being destroyed, and yet very little has been done either by private or by public action to protect one of the greatest resources of the Southern States.

This is the more remarkable when we consider the enormous wealth represented by the long-leaf pine belt. There is a strip of pine forest about one hundred miles wide that begins in North Carolina and follows the Atlantic and Gulf Coast plain to Texas, crossing six States, and covering an area of about 130,000 square miles. At a rough estimate, there may be 50,000,000,000 feet standing in this area, and if we take the values of timber and turpentine, the annual product of the forests of the South will approach in value the product of her cotton fields.

The pineries of the South now yield naval stores worth nearly \$10,000,000 a year. The total production amounts to 340,000 casks of spirits of turpentine, and 1,490,000 barrels of resin. In order to produce this enormous yield, some 2,500,000 acres of pine forest are being worked, and nearly 1,000,000 acres of virgin forest are invaded annually. Now, no one will claim that these pineries are inexhaustible, for there has actually been a decline in the production of naval stores within the past eight or ten years. The reckless cutting and tapping of trees have made great inroads into the magnificent stretch of pine. Railroads have opened up many new tracts of timber, the old water-mills have been replaced by steam saw-mills, and, when the supply in the neighborhood was exhausted, tram-roads have been built or the steam mills taken to new territory. Thus, the work of consumption and denudation has been carried on to such an extent that fears are just now beginning to be entertained that these valuable forests will be sacrificed to the greed for immediate and temporary gain.

The truth is, the long-leaf pine belt is the backbone of the South Atlantic States. For 150 years it has been the chief resource of the people who dwell in the belt. The production of pitch and tar was begun in North Carolina during colonial days, and, as the State took the lead in the industry, its people were called "tar heels." There has been a heavy decline in the production of naval stores in North Carolina. This decline, amounting to fully 40 per cent., is due simply to the exhaustion of the pine forests. Of course, much has been written on the destructive agency of the turpentine industry, and many suggestions have been made regarding changes and improvements which are necessary. It is agreed that the turpentine industry, as carried on in the United States, results in great loss and damage, directly and indirectly. Compared with the way in which the French gather turpentine, our methods seem crude, wasteful and almost irrational.

The American turpentine workers still continue to follow the old-time methods of tapping the trees for their sap. They have made few changes, and have adopted few improvements. They cut a deep, broad "box" at the base of the tree, and then the surface above the box is laid bare. The trees are worked for four or five seasons, when they become practically exhausted of their sap. The forest is then abandoned to the elements, to the bark-beetles and pine-borers, and, finally, the splendid trees are blown, burned or cut down. The French turpentine worker cuts no deep box into the tree, but uses a pail,

into which the resin or crude turpentine is conducted by a gutter. He makes only a small chip about three or four inches wide, and this is enlarged from time to time. After five seasons' working, the trees are given a rest of several years, and so, by alternating periods of tapping and of rest, a tree can be profitably worked for fully fifty years. The French also take measures to regenerate their pine forests and to keep the trees strong and uniform.

If our turpentine workers understood the first principles of forestry they would modify their destructive methods. With more knowledge based on experience, the day will come when the Southern people will see that good husbandry consists in management, not destruction, of their forest resources; that some precautions and some protection are necessary against fire, as well as individual greed; that the present policy of the turpentine workers is lamentably wasteful and short-sighted; in other words, that it is more profitable to work the pine forests for fifty years, instead of five years; and, finally, that the lumber and turpentine industries, while changing the face of Nature, and even the climate of the country, are slowly, but surely, making loss and trouble for this and succeeding generations.

According to the *Agricultural Gazette*, of New South Wales, the true opium poppy can be easily and successfully grown in that country, where, in favorable seasons, the plant will flower in about fifteen weeks from the time of planting. As soon as the flower falls, the capsule is slightly cut across one side in the afternoon to let out the milky juice. About four wounds are made. The next morning the milky juice will have hardened into a thin gum, which is scraped off with a blunt knife, and transferred from the knife into a clean tin vessel. The unwounded side of the capsule is operated on the following afternoon. The collected gum or opium is made into thin cakes and carefully dried in the shade. The work of opium collecting is one which can be done by careful women and children. When nothing but the seeds or heads are required the poppy is planted broadcast and hoed out or thinned to a distance of nine inches apart. About 40,000 heads can be gathered to the acre, and when dried they are worth about \$5 per 1,000. The seed bring 25 cents an ounce in Sydney.—*Garden and Forest.*

In a lecture on *The Adulteration of Drugs*, Dr. Willis G. Tucker, Director of the New York State Board of Health Laboratory, closed his remarks with the following sensible statements:

"I have little sympathy with the sensational revelations that are made in a spasmodic way from time to time by the newspapers, and occasionally by State officials. They are so often exaggerated and unjust that they accomplish little good and sometimes do much harm. They cast reproach upon a reputable body of men, and the motives which instigate these exposures are not always above suspicion. The cause of sound pharmacy will not be advanced by sensational disclosures in the public prints, and only as, by gradually effected changes, we weed out the incompetent or restrict their privileges, and put a premium upon competency and ability, and secure for those who enter upon this calling a better training for the work and magnify its importance and its responsibilities, can we hope to raise the standard of American pharmacy to the high plane which it should deservedly, and in my belief will eventually, occupy."

EDITORIAL.

INSTRUCTION BEFORE DEGREES.

It has not been long since we heard a well-known teacher in a college of pharmacy say in reference to education :

"It is not so much a question of degrees as it is one of instruction ; offer the right kind of instruction and let the degrees be a secondary consideration."

It strikes us that this is the key-note of the whole subject.

The college graduate will be judged not only by his knowledge at the prescription counter, but also by his behavior and tact towards customers. When he is placed on trial by the proprietor, does he show these qualifications, or does he display his titles? Does it matter then whether he has had 600 or 6,000 hours of college instruction? He may be able to write all the reactions involved in the preparation of *liquor ammonii acetatis*, but if he cannot decipher the obscure chirography of the physician, if he cannot name the price of this simple prescription without hesitation, and if he cannot bottle, cork, wrap and deliver in a way to inspire the confidence of both customer and proprietor, he is lost so far as that situation is concerned. Where, and where only, can he best learn these small but vital matters? Is he to be kept from them until he is twenty-one years of age, and then, loaded with a heavy title, go into a store and have the errand-boy give him points? Or is he to "cram" for 600 hours, pass his examinations, and then go into a store to learn the business?

We have had too many windy effusions about the number of hours of instruction. Knowledge cannot be measured by the yard-stick, nor by hours of instruction. It is gained by experience and judicious study, not by memorizing the order of the words on the page of a book. Everyone who knows anything of education is aware that one hour of study a day for six days is better than six hours of study in one day, or that six hours of study per week for six weeks are better than thirty-six hours of study in one week. The same principle applies to laboratory work. Is not the student who devotes four years to studying pharmacy, and who distributes his time between the college and the shop, infinitely better educated than the one who has all his college study "crammed" into one year, then graduates with flying colors, and afterwards starts in to really learn the rudiments of the drug business, and get his shop practice?

The respectable medical colleges have devoted large sums of money to equip and conduct hospitals in order that their students may combine theory and practice. Would any sane medical student, or graduate either, undertake an important amputation after having simply studied a work on surgery? Does he not first dissect the cadaver, then see the operation performed by others on the living subject, and then assist at one or more similar operations before he undertakes it himself? Is the case of the pharmaceutical student very different from this? We have had enough of this talk in the American Pharmaceutical Association about pharmaceutical education. It is about time to rule the whole subject out of order, or in some other way deliver the members from the "long-winded" papers and "spoutings" of a few charlatans who never had the advancement of pharmaceutical education at heart, who are not in science for the sake of science, and to whom anything but their own unmerited advancement is a foreign thought.

THE MEDICINAL VALUE OF THE RARER ELEMENTS.

The paper on page 511 of this issue, by Mr. H. C. Demming, may strike some as being in advance of our present knowledge, but a little more careful study will show that it is full of practical suggestions. The compounds of the rare metals may possess valuable curative powers, and they should receive careful attention, not because they are rare, but because they have specific properties which have never been investigated.

At the present time uranium nitrate is on trial in the treatment of diabetes mellitus, and an article in the *British Medical Journal* for August 24th gives the experience of Dr. Samuel West, of St. Bartholomew's Hospital, London, with this agent. Chittenden, in 1888, showed that full doses of uranium salts produced in dogs acute parenchymatous nephritis, with much albumin in the urine. Further investigation by Dr. West showed that even in small quantities uranium and its salts had an inhibitory influence on amylolytic and proteolytic action, so that a few drops of a 1 per cent. solution of the nitrate prevented the action of ptyalin, and a rather larger quantity that of pepsin and trypsin.

The effect on the human subject has been to greatly retard if not inhibit the secretion of glucose. In the hospital experiments two salts were employed—the nitrate and the double chloride of uranium and quinine. It was found that the best method of administering the nitrate was by free dilution with water, and after food, commencing with a small dose of one or two grains twice daily after the chief meals, and increasing the dose slowly at intervals of a few days, until its effect was produced. As much as fifteen and twenty grains were given three times a day without causing irritation of the stomach and bowels.

We may expect ere long to have physicians call for compounds of all the rarer elements.

THE NATIONAL FORMULARY.

The Kentucky Pharmaceutical Association has issued a circular calling attention to its issue of an epitome of the National Formulary, in accordance with the action of the Association at its meeting in 1894, when the President, Mr. R. J. Snyder, made the suggestion that an epitome be prepared and supplied to members at actual cost price, so as to enable them to deliver the book to physicians with their compliments, and in that way induce the latter to prescribe legitimate remedies whose composition is known.

A similar suggestion was made by Mr. John F. Patton in the Pennsylvania Pharmaceutical Association, and published in this JOURNAL, 1894, page 330, but it did not receive any further attention at the hands of that body, probably because it was recommended to give the National Formulary as it is now published to physicians. A suggestion similar to that of the Kentucky Association was made in the meeting of the American Pharmaceutical Association last year, at Asheville; and this year, at Denver, Council was given power to act.

The epitome, as issued by the Kentucky Association, is a small, leather-bound, vest-pocket edition, containing fifty-three pages, and is so arranged that the name (according to scientific nomenclature), ingredients and quantity in each dose, and general medical properties of each preparation, can be seen at a glance. A therapeutic index has also been added, whereby a number of formulas may be found for the same indications.

The National Association should have led in this matter, but it is to be hoped that the Kentucky Association, with the good of all at heart, will do as the originators of the Formulary did—offer it to the American Association next year, and thereby enable every pharmacist in the United States to secure copies at a very low price; for by printing one large edition, a much better rate can be secured than by each State Association undertaking to print its own.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

CHEMISTRY OF URINE.—A practical guide to the analytical examination of diabetic, albuminous and gouty urine. By Alfred H. Allen, F.I.C., F.C.S. Philadelphia: P. Blakiston, Son & Co. 1895.

There have been many books on the chemistry of urine written by physicians, but few by the members of other professions. Now, however, we have one by a chemist of more than ordinary ability, who writes not of what others have said so much as of his own experience in his laboratory with a great variety of samples.

Mr. Allen is well known by his valuable volumes on Commercial Organic Analysis, and the present work of 212 pages is in binding uniform with them.

The scope of the work can best be comprehended by the following quotation from the preface: "While attempting to bring the majority of the tests and processes within the scope of every-day clinical diagnosis, or of the reports required for life assurance, I have also described other methods which cannot be applied except by those accustomed to analytical work, and who are possessed of the appliances of a well-appointed laboratory.

"While desiring to give special prominence to the methods of examining diabetic, albuminous and gouty urine, it appeared undesirable to omit all reference to subjects of collateral interest, such as the proportions of urea and total nitrogen in urine, the recent researches on creatinine and on xanthine derivatives, and the behavior of urinary coloring matters."

The author has adhered to a rule in regard to spelling, which should be universally adopted, as follows: "The term 'albumen' should be limited to its original signification, namely, the white of egg, the word 'albumin' being applied to the most characteristic constituent thereof, and extended to other analogous substances contained in blood-serum, etc."

The following are the leading sections of the work: General composition of urine, preliminary examination of urine, diabetic urine, albuminous urine, the nitrogenized constituents of urine, coloring matters of urine, and appendix.

Acetonuria is included in the section on diabetic urine, and the author, after quoting a number of tests, recommends the one in which iodoform is formed by the addition of potassium hydrate and solution of iodine.

A number of processes are given for the detection and estimation of glucose, and we note with satisfaction that it is recommended to remove phosphates, uric acid, xanthine, creatinine and albumin, before applying the tests for glucose or attempting to estimate it; this is a precaution which is not sufficiently emphasized in the works which have heretofore been written on the subject. The phenyl-hydrazine test has received full consideration, the following statement being made in regard to it: "As all the methods of detecting sugar in

urine, which are based on the reducing action of glucose, are more or less vitiated by the presence of other reducing bodies, a special reagent for glucose has an exceptional value. This reagent exists in phenyl-hydrazine."

In reference to albumin, the author states: "Normal urine is almost, if not entirely, free from any trace of albumin or other of the allied substances classed together under the generic name of 'proteids.' But under particular conditions of fatigue or disease, albumin may appear in the urine."

The total nitrogen is estimated by a process worked out in the author's own laboratory, and the amount of urea is determined by a modification of Squibb's process.

Creatinine is very fully considered, and the fact is pointed out that its behaviour with picric acid gravely affects the value of that reagent as a test for small quantities of sugar in urine.

It also reduces Fehling's solution on boiling, the blue liquid changing to yellow, but no cuprous oxide separates. In view of these statements, it is all the more remarkable that most works on the analysis of urine say nothing about preparing a urine by removing this and other bodies, before applying the ordinary tests for glucose.

The illustrations of the book are well executed and useful. The appendix contains a number of valuable tables. On the whole we are prepared to say that this is the best book on this subject that has ever been written, and all those physicians and pharmacists who have occasion to analyze urine should give it the closest study.

THEORETICAL CHEMISTRY. From the standpoint of Avogadro's rule and thermodynamics. By Prof. Walter Nernst, Ph.D., of the University of Göttingen. Translated by Prof. Charles Skeelee Palmer, Ph.D., of the University of Colorado, with twenty-six woodcuts and two appendices. Macmillan & Co., London and New York, 1895. 697 pages. Price, \$5.00.

When the German edition appeared, about two years ago, it was at once recognized as filling a demand created by the recent developments of physical chemistry. It might be argued that the two excellent treatises of Ostwald cover the whole field, which they do, but the comprehensive "Manual of Chemistry" is too exhaustive for the average student and can only be grasped completely by the specialist in physical chemistry, and the "Outlines" is too brief for those who desire to extend their knowledge beyond the mere elements of the subject. Prof. Nernst, with his timely volume, has happily supplied the existing deficiency.

A brief enumeration of the subjects treated will give the reader a fair idea of its contents. The introduction treats of the fundamental principles of modern investigations. Book I considers the universal properties of matter, such as the gaseous, liquid and solid states of aggregation; physical mixtures and dilute solutions. Book II treats of the atomic theory, determination of molecular weights, kinetic theory of the molecule, constitution and absolute size of the molecules, colloidal solutions, and physical properties of salt solutions. In Book III, the transformation of matter is discussed. This includes the law of mass reaction, chemical statics of homogeneous and heterogeneous systems, chemical kinetics and chemical equilibrium in salt solutions. Book IV, the transformation of energy or thermo-chemistry, electro-chemistry and photo-

chemistry. Appendix I contains the more important developments of theoretical and physical chemistry for the year 1893. Appendix II consists of a synchronistic table of chemical periodicals.

A translation of this valuable volume into the English language was a most laudable undertaking. It is unfortunate, however, that such a work must be adversely criticised. The translator aimed "to combine fidelity to the original, with clearness in good English." If he succeeded in the former he certainly fell far short in the latter. The frequent use of the indefinite pronoun "one" makes the reading monotonous at times. In a single paragraph it occurs four times, and not less than a half a dozen times on a number of pages. The translation in some cases is too literal. While such translations cannot be considered as violating the principles of rhetoric, yet they are far from choice English.

On page 20, foot-note, it is recommended to adopt the word "knall-gas" into the English language. Cannot we find a word for the explosive mixture of hydrogen and oxygen that possesses a more euphonic sound than "knall-gas," with an English pronunciation?

On comparing the English with the German, numerous questionable translations are immediately revealed. *Verschiedene* and *verschiedenste*, page 311, line 9 from the top, are both translated by *most various*; "*Schüttel-trichter*" by *shaking funnel*, see page 642, line 2 from the top; on page 406, first line from the bottom, "*fremde*" is translated by *strange*, and "*festsetzen*" by *insist*, see page 648, line 15 from the top.

In many cases, especially the latter part of the book, many German words are retained in parentheses, as if the translator was in doubt of their exact meaning. Every German student realizes how difficult it frequently is to find an exact English equivalent; for example, "*zur ersten Orientirung*." Nevertheless, the book was unquestionably intended for English readers; would the best English equivalent therefore not have been better?

Notwithstanding these shortcomings the book will add much to the knowledge of the diligent reader.

LYMAN F. KEBLER.

MONOGRAPH ON FLUID EXTRACTS, SOLID EXTRACTS AND OLEORESINS. WITH APPENDIX. By Joseph Harrop, Ph.G., author of "Monograph on Flavoring Extracts," etc. Edited by Herbert B. Harrop, Columbus, Ohio. Harrop and Company, 1895. 231 pp.

This work demands rather more than passing notice. It illustrates what any pharmacist may do by the application of "will, muscle and mill," and then transferring to paper an account of the experience gained thereby.

The introduction gives a concise statement about weights and measures. Part First is devoted to articles used in the manufacture of medicinal extracts, viz.: Alcohol, water, glycerin, acetic acid, crude vegetable drugs, rice chaff.

Part Second treats of processes. Part Third considers fluid extracts, and gives the method of preparing some 600 of them, which practically covers all that are in the market. Part Fourth, in like manner, is devoted to solid extracts. Part Fifth, oleoresins. Part Sixth, appendix. The author divides the fluid extracts into three classes: (A) When the menstruum is alcohol, (B) when it is diluted alcohol, (C) when it consists of varying proportions of alcohol and

water. Each class is headed by a typical formula, to which the preparations falling under that class are referred. The other classes of preparations are treated in a somewhat similar manner, thereby enabling the large number of formulas to be condensed into a very small space.

The preliminary remarks of the author in reference to each class of preparations are to the point, and we can generally endorse them, except the statement that "the Pharmacopœia is a sealed book," which, we presume, was intended as a kind of apology for printing so many formulas that are already in the Pharmacopœia. No such apology was needed, for there is ample room for such a book as this in addition to our national standard, especially in the field of solvents, where the author might have enlarged considerably. For example, acetone is not mentioned, and it is used very extensively as a solvent at the present time, especially for oleoresins, as pointed out by Beringer (AM. JOUR. PHARMACY, 1892, p. 145). Then, instead of 36 per cent. acetic acid, as mentioned by the author, a 60 per cent. acid is probably more desirable, as shown by Remington (AM. JOUR. PHARMACY, 1893, p. 103). We trust that Mr. Harrop will enlarge on this part of the subject; what is needed is not so much more formulas as more solvents, and the best means of replacing alcohol. We can easily conceive of the whole class of solid extracts being satisfactorily made without the use of one drop of alcohol. We are aware that it has been done by some larger firms by merely subjecting the drug to live steam, but that could hardly yield a satisfactory preparation in many cases.

THE POCKET MATERIA MEDICA AND THERAPEUTICS. A Résumé of the Action and Doses of all Official and Non-official Drugs now in Common Use. By C. Henri Leonard, A.M., M.D. Second edition. The Illustrated Medical Journal Company, Detroit, 1895.

The author states that this book is designed as much for the practitioner as for the student. It can readily be comprehended how the former would find it valuable, but to the student it could not be of much value, except for "cramming" purposes. The descriptions are concise, and a large amount of useful information is condensed into a very small space.

The index is an important feature, covering 68 of the 387 pages in the book.

EXERCISE AND FOOD FOR PULMONARY INVALIDS. By Charles Denison, A.M., M.D., Denver, Col. The Chain & Hardy Company, 1895.

This little work, of 71 pages, is made up of two essays, one on "Exercise for Pulmonary Invalids," and the other, on "Food for Chronic Pulmonary Invalids."

The author has very decided views on these two subjects, but his directions for exercise, as well as for diet, appear more suited to a person in full health than to an invalid. The book should be read, however, by all those who suffer from sedentary habits, and by those predisposed to pulmonary troubles.

EXPERIMENTAL FARMS. Reports to the Minister of Agriculture, Ottawa, Canada, 1895. William Saunders, Director. Pp. 422.

UEBER DIE RINDE und die Blätter von *Drimys granatensis*, L. Von O. Hess. *Liebig's Annalen*, 286, pp. 369.

THE PHARMACAL DIGEST, edited by H. D. Dietrich, Portland, Ore., is the youngest member of the already large family of drug journals. It is published monthly, and will endeavor to give all that is good and of practical

value appearing in the drug journals of the present day, "boiled down, and presented without flowery comment or verbosity of any character."

THE COLLEGE OF PHARMACY OF THE CITY OF NEW YORK. By Prof. H. H. Rusby, M.D. Published by the Faculty. An interesting history of the foundation and development of the New York College of Pharmacy, with a number of illustrations. The first steps towards the foundation of the College were taken in 1829, and a charter was secured in 1831. The objects of its establishment were stated to be "for cultivating, improving and making known a knowledge of pharmacy, its collateral branches of science, and the best mode of preparing medicines and their compounds, and of giving instruction in the same by public lectures."

NORTH CAROLINA PHARMACEUTICAL ASSOCIATION, PROCEEDINGS OF THE SIXTEENTH ANNUAL MEETING, Morehead City, July 10 and 11, 1895.

The following papers are printed in full: *Analysis of Sumac Root*, by E. V. Howell, Ph.G., of Rocky Mount, N. C., and *The Hypothetical Element Phlogiston*, by Augustus Bradley, Ph.G., of Raleigh, N. C.

PROSPECTUS OF THE ST. LOUIS COLLEGE OF PHARMACY. Thirtieth Annual Session, from October 7, 1895, to April 15, 1896.

TWENTY-EIGHTH ANNUAL ANNOUNCEMENT OF THE MONTREAL COLLEGE OF PHARMACY. Session 1895-96.

THE TWENTY-FIFTH ANNUAL REPORT OF THE COUNCIL OF THE PHARMACEUTICAL ASSOCIATION OF THE PROVINCE OF QUEBEC. For the year ending April 30, 1895.

TESTS AND ASSAY PROCESSES FOR SURGICAL DRESSINGS AND BELLADONNA PLASTERS. Reprinted contributions to the pharmaceutical press. From the Seabury Pharmacal Laboratories, New York. 1895.

SCIO COLLEGE, DEPARTMENT OF PHARMACY. Annual Announcement, 1895-96.

ANNUAIRE DE L'ÉCOLE DE MÉDECINE ET DE CHIRURGIE DE MONTREAL, FACULTÉ DE MÉDECINE DE L'UNIVERSITÉ LAVAL DE MONTREAL. 53^{ème} Année, 1895-96.

STATE BOARDS OF MEDICAL EXAMINERS VS. MEDICAL COLLEGES. By Thomas H. Hawkins, A.M., M.D. Reprint from the *Denver Medical Times*.

MINNESOTA BOTANICAL STUDIES, XXIII. A contribution to the bibliography of American algæ. By Josephine E. Tilden. Bulletin No. 9, Part VI, August 26, 1895. Conway MacMillan, State Botanist.

PROCEEDINGS OF THE CONNECTICUT PHARMACEUTICAL ASSOCIATION. Nineteenth annual meeting, held in Norwich, Conn., February 5 and 6, 1895.

PHARMACY. A presidential address by N. H. Martin to the British Pharmaceutical Conference, at the thirty-second annual meeting at Bournemouth, England, July 30, 1895.

THIRD ANNUAL REPORT OF THE TENNESSEE BOARD OF PHARMACY. For the year ending June 30, 1895.

PROCEEDINGS OF THE TENNESSEE DRUGGISTS' ASSOCIATION, at the tenth annual meeting, July 17, 1895.

THE AMERICAN JOURNAL OF PHARMACY

NOVEMBER, 1895.

THE HISTORY OF ARGON AND HELIUM.

BY ALFRED R. L. DOHME, PH.D.

Toward the close of the year 1894 Lord Rayleigh, professor of physics at the University of Cambridge, and secretary of the Royal Society of London, published a paper¹ in the Proceedings of the Royal Society, in which he described some anomalies encountered in determinations of the density of nitrogen gas. Lord Rayleigh communicated his curious experiences to Prof. William Ramsay, professor of chemistry, University College, London, and together they undertook to solve the intricate and intensely interesting problem. On January 31, 1895, they read a paper before the Royal Society, entitled, "Argon, a New Constituent of the Atmosphere," and the result was that the scientific world in particular, as well as the world in general, were set on edge, unbalanced as it were, and neither have yet fully recovered their equilibrium. To think that for more than a century people had been daily breathing, handling, testing, analyzing and discussing the all-pervading atmosphere of our planet, and had not, until the year 1894, discovered that it contained something besides oxygen, nitrogen, carbon dioxide, water vapor and nitrous acid was touching that world in a very tender spot, and it felt hurt. Facts are facts, however, and never respect feelings. We may very properly consider the discovery of these English scientists as epoch-making, because, as we shall see, they introduce into the science of chemistry something that is entirely new to it. Lord Rayleigh had

¹Rayleigh, "On an anomaly encountered in determinations of the density of nitrogen gas." Proc. Roy. Soc., 55, 340 (1894).

found that nitrogen extracted from chemical compounds is about 0.5 per cent. lighter than atmospheric nitrogen. With Professor Ramsay he then made nitrogen in six different ways, and determined the density of each kind of nitrogen. Let us, for convenience, call this nitrogen obtained from chemical substances, "chemical nitrogen" to distinguish it from "atmospheric nitrogen," as this term had been understood prior to the autumn of 1894.

The chemical nitrogen was obtained:

- (1) From nitrous oxide, and gave a density of 2.2990
- (2) From nitric oxide, and gave a density of 2.3001
- (3) From ammonium nitrite purified at a red heat, and gave a density of 2.2987
- (4) From ammonium nitrite purified in the cold, and gave a density of 2.2987
- (5) From urea by means of sodium hypobromite, and gave a density of 2.2985
- (6) From air by means of hot magnesium and subsequent liberation as ammonia and conversion into nitrogen by means of calcium hypochlorite, and gave a density of 2.29918

The mean of all these densities is 2.2990, which is hence the density of chemical nitrogen, while, as a mean of three experiments, the density of atmospheric nitrogen was found to be 2.3102.

The difference was naturally at first attributed to impurities, but none such in form of a lighter gas could be found in the chemical nitrogen. The next explanation was that some of the nitrogen molecules of the chemical nitrogen had been split up into atoms. Both kinds of nitrogen were then tested in this particular by subjecting them to the silent electrical discharge, and both were found to retain their volume unaltered, thus dispelling the possibility of this explanation. There remained, then, only as the explanation of the discrepancy in weight, the fact that one of the gases was a mixture of several gases. To assume that chemical nitrogen was a mixture was contrary to experience and to Stas' work. Hence the hypothesis was made that atmospheric nitrogen contains something else than nitrogen. The identification of "phlogisticated air" with the constituent of nitric acid is due to Cavendish, whose method consisted in operating with electric sparks upon a short column of gas confined with potash over mercury at the upper end of an inverted U tube¹. The repetition of Cavendish's experiments

¹ Cavendish—Experiments on Air; *Phil. Trans.*, 75, 372 (1785).

only served to increase the admiration with which this great investigator is generally regarded. Cavendish, after repeatedly sparking this "phlogisticated air," *i. e.*, nitrogen with oxygen, found that some always remained that could not be converted into nitric acid, and that it constituted about $\frac{1}{120}$ part of the whole. Whether he regarded this gas as an impurity or as nitrogen cannot be determined, but it is more than likely that what he had in the top of his inverted U tube was what we now call argon. Cavendish's experiments were repeated, and it was found that the amount of his unsparkable gas was proportional to the amount of air operated upon. A sufficient quantity was made to determine its spectrum, and it was found that it did not give the spectrum of nitrogen, but of argon. Next, Rayleigh and Ramsay made argon in quantity from air by removing, one after the other, constituents of the latter; thus moisture by means of phosphorus pentoxide, oxygen by means of sparking with hydrogen, carbon dioxide and nitrous acid by means of caustic alkalies, and, finally, nitrogen by means of red hot magnesium and magnesium vapor. This is a very tedious operation, especially the removing of the last traces of nitrogen. They then proved that chemical nitrogen does not contain more than traces of argon, by treating a large quantity of the former in the same way as they had treated the air. They invariably found argon present, but only to a small fraction of the extent it would have been there if atmospheric nitrogen had been used. Thus, where they would have obtained 30 c.c. of argon if atmospheric nitrogen had been used, they actually only found 3.3 c.c. of argon. This had, of course, been introduced from the air and the water used, and to their minds proves that chemical nitrogen does not contain argon.

PROPERTIES OF ARGON.

The density of argon made by the Cavendish oxygen method was found to be 19.70, H_2 , or the hydrogen molecule, being taken as 1; while that of argon made by means of magnesium was found to be 19.90. The spectrum in wave lengths is:

Blue line, wave length	487.91	Strong.
" " " "	476.50	Fairly strong, characteristic triplet of lines.
" " " "	473.53	
" " " "	472.56	
Red line, " "	696.56	Strong.
" " " "	705.64	"

Yellow line, wave length	603·84	Strong.
Green line, " "	561·00	"
And four other green lines.		
Blue-violet line, wave length	470·2	Strong.
Violet line, " "	420·0	"
And five other violet lines, all strong.		

Professor Crookes, who is studying the spectrum of argon, has concluded that this gas possesses, most likely, two spectra, which he thinks he can separate. This would indicate that argon is a mixture of two gases. Argon is about two and one-half times as soluble in water as nitrogen, and possesses, approximately, the same solubility in water as oxygen. We hence find, as we would expect as a result of these determinations, that rain-water contains more argon than nitrogen.

Professor Olszewski, of Cracow, has liquefied argon, and also solidified it by the combined action of extremely high pressure and low temperature upon it. He obtained it in white crystals which melt at -189.6° C. Its critical temperature is -121° C., and its boiling point is -187° C., both of which are lower than the respective constants of oxygen.

By determining the velocity of sound in a gas, we can determine the ratio of the specific heat at constant pressure to that at constant volume. In the case of argon, this ratio was found to be 1.66, which is proper for a gas in which all the energy is translational, *i. e.*, to a gas that is monatomic in its condition. The only other such known gas is that of mercury at high temperatures.

All attempts to induce argon to combine with other elements have proven abortive, and the gas has well-earned its name of "no energy" from the Greek words *a* and *ἔργον*, contracted into *ἄργον*. The amount of argon in the air is, approximately, 1 per cent.

From Avogadro's law we know that the density of a gas is half its molecular weight; and as the density of argon is, approximately, 20, its molecular weight must be 40. But its molecule is identical with its atom; hence, its atomic weight is 40, if it be an element, or the mean of the atomic weights of the gases constituting argon, if argon is a mixture of gases. The spectrum work of Professor Crookes argues that argon is a mixture of gases, while Professor Olszewski's work, showing that it has a definite melting-point, a definite boiling-point, and a definite critical temperature and pressure, and that on compressing it in the presence of its liquid, the pressure remains

constant until all gas has condensed to liquid, strongly indicates, if it does not prove, that argon is an element. Further work alone can prove which view is correct.

HELIUM.

In April, 1895, Professor Ramsay was studying the nature of gases obtained by heating minerals, his object no doubt being to obtain argon in this way. From some minerals he did obtain argon, but from many of them he obtained a very light, colorless gas, that was lighter than argon and gave a different spectrum, and in particular gave a brilliant D_3 line in the yellow, which line had been noticed in the solar spectrum, but had never been obtained from an element on the earth. He named this gas helium, from $\eta\lambda\iota\omicron\varsigma$, the Greek name for the sun. The D_3 yellow line had been observed thirty years before by Lockyer and Frankland, who supposed it to be that of a hypothetical element, which they named helium. Signor Palmieri, in Italy, some years since, obtained a soft substance from some ejected lava of Mt. Vesuvius that gave a yellow spectral line 587.5, the same as the D_3 line, but he gives no details. Dr. Hillebrand, of Washington, D. C., studied some years since, the gases occluded by minerals, in particular uraninites of various localities,¹ but found only nitrogen, as the spectrum of the gas obtained was that of nitrogen, and he obtained nitric oxide on sparking it with oxygen. He sent some of the uraninite to Professor Ramsay, who found that it did contain 10 per cent. of nitrogen, but also helium. The nitrogen masked the helium spectrum considerably, and, as Professor Ramsay says, it is likely that if Dr. Hillebrand had been working with clèveite he would have discovered helium. To extract the helium, five grammes of coarsely powdered mineral are heated in a glass bulb (made of hard glass) which has been exhausted by means of a Töpler pump. Thus are obtained CO_2 , H, N, H_2O , and helium. Many rare minerals were examined, and the following yielded more or less helium in the order of their mention: monazite, clèveite, bröggerite, pitchbende, xenotrim, orangeite, samarskite, yttrotantalite, hjelmite, fergusonite, tantalite, polycrase, etc. Professor Ramsay used mainly clèveite and bröggerite, because they were most available. Helium must be mechanically held by the minerals, since any of them, when heated and allowed to cool in helium, do not take up any of the

¹ Bulletin U. S. Geolog. Survey, 78, 43.

latter. The impurities of the resulting gas were removed as follows: CO_2 by potassium hydroxide; water vapor by phosphorus pentoxide; hydrogen by sparking with an excess of oxygen, removing the excess of the latter by means of pyrogallie acid. The nitrogen was removed by repeatedly passing the gases over and through red-hot magnesium and its vapor.

The density of helium as the mean of five determinations was found to be 2.13 ($\text{O} = 16$). The half wave-length of sound in helium was found to be 101.5 mm. and in air 36.04 mm. By the same calculation as was given under argon above, it was found that helium is a monatomic gas. If the density as compared with H_2 is 2.13, and it is monatomic, then its atomic weight is 4.26. It is very slightly soluble in water, one volume absorbing only 0.0073 volume of the gas. This is the lowest solubility ever recorded. It is insoluble in absolute alcohol and in benzene. Its spectrum is made up of several lines in the red, orange-red and yellow. Several lines are identical with argon lines; thus two in the red and one in the orange-red, but the bright red line of argon is faint in case of helium, and the bright red line of helium is faint in case of argon. The characteristic D_3 yellow line of helium is a doublet, one line of which is faint and the other very bright, the distance between them being about one-fiftieth of that between the D_1 and D_2 lines of the solar spectrum.

An analogy exists between argon and helium. Both are very inert and cannot be separated when mixed, on account of their similarity in properties. Their densities and spectra, however, plainly prove their difference. Both are unattacked by oxygen when sparked with it, and both are unattacked by the vapor of magnesium. Both are monatomic and these properties differentiate them from all other elements. A most anomalous property of helium is its refractive index—which is about one-tenth that of hydrogen, a lighter gas—a fact which is as unlooked for as it is inexplicable. Why is argon in the air, and helium not there present, but confined to minerals?

Dr. Johnstone Stoney¹ probably gives the correct answer to this question. He shows that, if hydrogen were present in the atmosphere, it would at once leave this planet by virtue of the velocity of its own molecular motion, and migrate to a planet possessed of suf-

¹ *Chemical News*, 1895, 71, 67.

ficient gravitational attraction, enough mass, to hold it fast. This, he says, accounts for the presence of helium and hydrogen in the chromosphere, and for the absence of an atmosphere and of water vapor on the moon. It would account for the absence of so light a gas as helium in our atmosphere, and for the presence of the helium line in the spectrum of the chromosphere. If an element forms compounds, or is absorbed by solids, it will be found on the earth; hence, we find helium occluded in minerals, while argon, which is so heavy and dense, can be held as such about our planet. Argon occurs in our atmosphere because it is so inert that it does not form any compounds, and nitrogen is there present because it is also inert and rarely enters into combination. Its compounds, too, are mostly decomposed by water, and the excess of nitrogen, hence, is in the air. Oxygen is in the air because there is an excess over what is necessary to oxidize everything on the surface of the earth. If there are gases similar to argon in inertness, and whose density is not less than that of nitrogen, they may too be looked for in the air. The density of argon is too high, and cannot be accounted for by assuming that it is a mixture of A_2 and A_1 . As it clearly does not belong where its atomic weight places it in the periodic system, it must needs be a mixture, although its behavior near its critical temperature indicates that it is an element. There is, of course, no place for helium in the periodic system, as it lies between hydrogen and lithium. But we must not forget that there is no place for hydrogen, either, strictly speaking, and it may be that there may be an eighth group series at the beginning of our system, corresponding to the iron, nickel and cobalt, or the osmium, iridium and platinum series. If so, a third gas of atomic weight between hydrogen and lithium is yet to be discovered. It has been mentioned that argon and helium have some spectral lines in common. As no lines of any two elements have ever been found to coincide as yet, we are confronted with the possibility that both these gases contain a common ingredient. The density of helium is, however, already so low that it is difficult to imagine that it contains as an admixture anything much denser; for to possess the density it now has, considered as a mixture, the true helium would have to be possessed of a lower density still; in other words, it would have to be lighter still than it now is. On the other hand, an admixture of helium with argon would tend to make the density of pure argon, and also its atomic weight,

even heavier than it is. Hence, the supposition that they contain a common constituent is not fraught with much semblance of probability. We know that Professor Ramsay, Lord Rayleigh and many others are working at this most marvellously complicated array of phenomena presented by argon and helium, and, until more facts are forthcoming, it is useless to speculate what helium and argon are. *Veritas vos liberabit.*

BALTIMORE, October 7, 1895.

GRANULATED OPIUM.

BY LYMAN F. KEBLER AND CHARLES H. LA WALL.

"We recommend that granulated opium be used in the preparation of tincture and deodorized tincture of opium and that the use of precipitated phosphate of calcium be omitted in their preparation."

The preceding remark is taken from the "Report of Committee on Revision of the U. S. Pharmacopœia," submitted to the American Pharmaceutical Association at their Denver meeting in August.

Granulated opium has been an article of commerce for some few years past, although it never attracted the attention it deserves. The limited number who have become familiar with its use and advantages speak in the highest terms of its superiority over all other forms of the drug for quickly and easily manufacturing the various galenical preparations in which opium is the primary ingredient.

The percolation of finely powdered opium alone, which was authorized by the Pharmacopœia of 1880, and which was found to be impracticable, was supplemented in the last revision of the same work by the addition of 50 per cent. of precipitated calcium phosphate. This addition is a questionable improvement over the former process, leaving much to be desired in both elegance and expedition. The U. S. Dispensatory, 17th edition (p. 1390), refers to the subject as follows: "Precipitated calcium phosphate has been added, and finely powdered opium directed in the U. S. P. 1890 process, because much trouble seems to have been experienced in procuring at all times in the market the coarsely powdered opium which was the only kind suitable for use in the U. S. P. 1880 process."

The coarsely powdered opium, or granulated opium, as it is usually termed, is now easily obtainable and, as its use is constantly

increasing, we may fully expect to see it authorized in the next revision of the U. S. P. In appearance it is extremely characteristic, the opium being in the form of small, irregular fragments of nearly uniform size. No methods for its preparation have as yet been published to the writers' knowledge and it is probable that its manufacture will be conducted by those who are able to handle it in large quantity, as is the case with powdered opium.

The use of granulated opium is characterized by its simplicity and ease of manipulation. The process in general is as follows: Into the lower orifice of a cylindrical percolator place a plug of absorbent cotton, introduce the opium loosely, without previous moistening; then press it down firmly and cover it with a filter paper, held in place by a suitable weight. Any desired menstruum can now be carefully poured on, and after due maceration (which may vary from 4 to 12 hours, according to the desire of the operator) percolation may be allowed to proceed, the rate of outflow being so regulated as to exhaust the drug in the most thorough and speedy manner.

A number of experiments were performed with granulated opium in the preparation of the tincture, duplicate assays being made of each sample of the drug before percolation. Experiments were also made, using the U. S. P. 1890 process, the directions being followed as carefully and uniformly as possible, taking similar precautions in previously assaying the drug in each case. The U. S. P. 1890 process was experimented upon to verify, if possible, the results which were obtained by Professor Francis Hemm, and which were reported by him to the Missouri Pharmaceutical Association.¹

Professor Hemm used a powdered opium of a well-known make, which, when re-assayed, was found to contain 13 per cent. of morphine. The tincture prepared by him from the above opium, using the U. S. P. 1890 process, contained only 1 per cent. of morphine, and further percolation of the residue failed to extract more than a trace (.02 per cent.) of the missing alkaloid. Professor Hemm, in replying to a letter which was written to him, asking for any further information he might have, stated that, in the discussion which followed the reading of his article, the difficulty was attributed to the

¹ Report on Tr. Opium, by Prof. Francis Hemm, Missouri Pharmaceutical Association, 1895, *National Druggist*, August, 1895, p. 242.

precipitated calcium phosphate in the official process, as it appears to interfere in some unknown manner with the thorough extraction of the morphine from the opium.

The following experiments, performed by the authors of this article, seem to support this theory: 10 grammes of powdered opium were assayed in the usual way, and yielded 14.48 per cent. of morphine; 10 grammes of the same sample were mixed with 5 grammes of precipitated calcium phosphate and exhausted, as in the assay method, using diluted alcohol. The resulting filtrates, which amounted to more than 300 c.c., were assayed by the U. S. P. process for tincture of opium, and yielded 1.317 per cent. of morphine, showing a loss of 1.31 per cent.

The table of comparative results will be found at the close of the article. The experiments, in detail, were as follows:

No. 1.—100 grammes powdered opium, assaying 14.09 per cent., were used in the preparation of 1,000 c.c. of tincture of opium by the U. S. P. 1890 method. The finished preparation assayed 1.2 per cent. morphine, showing a loss of 2.09 per cent.

No. 2.—50 grammes powdered opium, assaying 13.92 per cent., were used as in No. 1. The resulting preparation assayed 1.195 per cent., the loss being slightly less than in the previous instance.

No. 3.—100 grammes granulated opium, assaying 12.15 per cent., were used, and, after placing the drug in the percolator in the manner previously mentioned, 100 c.c. of water were poured on and allowed to macerate for twelve hours. Percolation was then commenced with diluted alcohol, receiving the percolate into 100 c.c. of alcohol, contained in a graduated receiver; ten hours' time was allowed for percolation, and the assay of the tincture, when finished, showed 1.183 per cent. of morphine, a loss of but 0.32 per cent. This tincture deposited considerable sediment (a defect which was not observed in the subsequent cases where diluted alcohol was used in the preliminary maceration). It was filtered after standing one week, and re-assayed with the same results as before.

No. 4.—In this case 100 grammes of the same drug were operated upon and maceration for 4 hours with diluted alcohol was allowed. The percolation consumed but 6 hours in this case, making a total of only 10 hours from the beginning of the process to the end. The result of the assay was practically the same as before, being 1.180 per cent.

No. 5 was conducted similarly to No. 4, percolating for 10 hours, and using granulated opium which assayed 14.35 per cent. morphine. 1.370 per cent. of morphine was obtained in the assay of the completed tincture.

Nos. 6, 7 and 10 were executed in precisely the same manner as No. 5, and gave practically identical results.

In Nos. 8, 9 and 11 the only change made was in retarding the rate of percolation so that it covered 24 hours instead of 10 hours. The assays show a slight increase in the percentage of morphine extracted.

Nos. 12 and 13 were additional experiments with the U. S. P. process, the results being no more encouraging than before.

These experiments were all conducted in the most careful manner, using good quality precipitated calcium phosphate and making duplicate assays in nearly every case. The uniformly low results which were obtained by the official process indicate that the objections which have been offered to it are not without good foundation. The maximum loss by this process was 2.42 per cent., the minimum loss was 1.40 per cent. With the granulated opium process the greatest loss was 0.65 per cent., the least being only 0.15 per cent. A comparison of the two methods with reference to elegance and neatness gives immediate preference to the use of the granulated drug. The strictly followed U. S. P. process is anything but neat, and often involves difficulties which have a tendency to disturb the serenity of the operator's temper.

With regard to the rapidity of percolation the tendency of the granulated opium is to allow the menstruum to pass too rapidly, and it must be retarded somewhat in order to obtain the best results. With the official process the case is far different. No choice whatever is allowed the operator, who must submit to the inevitable and allow it to take its own time. Experiments conducted as uniformly as possible, produced widely different results in this respect, and the length of time required for percolation bears no simple relation to the percentage of morphine extracted, unless it be an inverse ratio, for in the instances when the percolate came through with exasperating slowness the loss of morphine appeared to be the greatest.

Summing up the entire work, it has been shown that a finished preparation of tincture of opium can be made by the granulated opium process in from 10 to 36 hours, with a loss of morphine vary-

ing from 0.3 to 0.6 per cent., which loss can be reduced by lengthening the time of percolation. The U. S. P. process requires from 60 hours to 6 days, with a loss of from 1.4 to 2.42 per cent. of morphine.

While this work was being undertaken inquiries were also made at a number of retail drug stores, in order to ascertain the extent of the use of the official process. Only a small percentage of the persons interrogated follow the process strictly; the majority do not use it at all, preferring to exhaust the drug in a more speedy and thorough manner. Some persons use it with the addition of sand or sawdust to hasten the percolation, in which case the precipitated calcium phosphate might just as well, or better, be omitted; this, however, was not done; the few who use the process expressed themselves, in most cases, as being dissatisfied with it.

The processes of the U. S. P. should in all cases be the best obtainable for their respective preparations. This is not the case with the process for tincture of opium, but it is hoped that a change will be made when the time comes, and we sincerely hope that granulated opium will be the form of drug officially authorized.

TABLE OF COMPARATIVE RESULTS.

Number.	Process Used.	Per Cent. of Morphine in Opium.	Per Cent. of Morphine in Tinc- ture.	Per Cent. of Morphine Lost.	Time Allowed for Macera- tion.	Time Con- sumed in Percolation.
1	U. S. P. 1890	14.09	1.200	2.09	—	6 days
2	U. S. P. 1890	13.92	1.195	1.97	—	2 days
3	Granulated opium	12.15	1.183	0.32	12 hours	10 hours
4	Granulated opium	12.15	1.186	0.35	4 hours	6 hours
5	Granulated opium	14.35	1.370	0.65	4 hours	10 hours
6	Granulated opium	14.35	1.370	0.65	12 hours	10 hours
7	Granulated opium	14.35	1.375	0.60	12 hours	10 hours
8	Granulated opium	13.70	1.355	0.15	12 hours	24 hours
9	Granulated opium	14.25	1.390	0.35	12 hours	24 hours
10	Granulated opium	14.35	1.370	0.65	12 hours	10 hours
11	Granulated opium	14.35	1.398	0.37	12 hours	24 hours
12	U. S. P. 1890	13.92	1.252	1.40	—	3 days
13	U. S. P. 1890	14.48	1.206	2.42	—	4 days

ADDITIONAL NOTES ON BLACK SULPHUR.

BY LYMAN F. KEBLER.

In the May number of this JOURNAL there appeared a few notes on black sulphur. I there invited correspondence for further information. Two very interesting and valuable letters were received from two eminent druggists. The object of this paper is to give the substance of these two communications.

Mr. A. E. Ebert:—"We sell several pounds a year to persons who administer it to domestic animals, being an ingredient, usually, of some private recipe they possess for the treatment of diseases of horses, swine, etc. Some forty years ago, when I first entered the drug business, we purchased black sulphur in quantities of 100 to 500 pounds, and it was much used in domestic practice by Germans, English and other old-country people.

"Originally, black sulphur was powdered crude sulphur or the skimmings or the residue from the purifications of the sulphur of commerce."

Mr. Ebert enclosed a sample of black sulphur from the stock of Ebert's Pharmacy. The composition was as follows: sulphur, 85.82 per cent.; charcoal, 9.28 per cent., and ash, 2.90 per cent.

Mr. Charles A. Heinitsh:—"Black Sulphur, Sulphur Cubillinam, Roszschwefel or Horse Brimstone, is crude or native sulphur. What was generally used years ago was the dark, the black, and the carbonaceous parts as it was mined; also the refuse or residue, after refining the sulphur and making the roll, either alone or with the iron which was found in it or mixed with it: the squamaferri or scaly iron, as it was called.

"The sulphur furnaces gathered and sold it as a by-product. For years my house sold it as a cheap brimstone or sulphur, used in horse and cattle powder, mostly for horse powder, as it was then considered more effectual in curing the scab and other skin diseases, which horses were afflicted with, than the refined. Whether this is so or not I am not able to say, but my father and his predecessors sold large quantities of it."

The information imparted by these two experienced druggists leaves no doubt as to what black sulphur was in former days, but the black sulphur of to-day is evidently a modern production.

From the analytical results and other information gathered here and there, I would suggest the following formula :

Sulphur	9 parts.
Lampblack or powdered charcoal	1 part.

If it is necessary to employ antimony sulphide, the following formula gives a fairly good product :

Sulphur	88 parts.
Antimony sulphide	12 "

I wish here to kindly thank Messrs. Ebert and Heinitsh for their useful information and prompt responses.

THE OILS OF WINTERGREEN AND BIRCH.

BY HENRY TRIMBLE.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 148.

In the year 1889¹ Mr. Hermann J. M. Schroeter and the writer made a chemical study of the oils of wintergreen and birch. Our results were criticised soon after by Dr. F. B. Power,² who offered, in the same article, the results of a similar study conducted by him, which results differed in almost every particular from those obtained by us.

Dr. Power, associated with Dr. Clemens Kleber, has recently³ published the conclusions reached after a further investigation conducted by them.

In this second study the authors have obtained results which in many respects agree with those obtained six years ago by Mr. Schroeter and myself; yet the casual reader would probably think, on examining their conclusions, that nearly all of them were new. Since writers of text-books often do not quote recent investigations, especially where there have been some differences of opinion, simply because they do not see comparative statements, I have thought that a concise account of the facts as they now exist might aid some writers to quote more recent views than those of Cahours in 1843. In making the following comparison, I wish it distinctly understood

¹ *Am. Jour. Pharm.*, 61, 398.

² *Pharmaceutische Rundschau*, 7, 283.

³ *Pharmaceutische Rundschau*, 13, 228.

that I am not endeavoring to cast a reflection on any of Dr. Power's results, but that I simply desire to have the facts of the case known.

SUMMARY OF THE MOST IMPORTANT CONCLUSIONS REGARDING THE COMPOSITION OF THE OILS OF WINTERGREEN AND BIRCH.

Trimble and Schroeter,
in 1889.

Power, in 1889.

Power and Kleber, in
1895.

"We find, in addition to methyl salicylate, in both oils a hydrocarbon of the formula $C_{15}H_{24}$ * * The amount of the hydrocarbon is from 0.3 to 0.447 per cent., and it becomes solid on standing a short time, or on cooling. It is probably made up of a solid and a liquid portion."

"The natural oil of wintergreen consists of methyl salicylate, with small amounts (0.3 per cent. or less) of a terpene. The latter is a slightly yellowish, somewhat viscid liquid, having an odor, as described by Cahours, resembling that of black pepper, a specific gravity of approximately 0.940, and does not solidify or separate any solid substance at a temperature of $-10^{\circ}C$."

"Oil of wintergreen (*Gaultheria*) contains about 99 per cent. of methyl salicylate, together with a small amount of a paraffin, which is probably triacontan, $C_{30}H_{62}$, an aldehyde or ketone, an apparently secondary alcohol, $C_8H_{16}O$, and an ester $C_{14}H_{24}O_2$."

"The oils are physically and chemically identical, the only difference detected being in the melting points of the hydrocarbons. That from wintergreen melted at from 10° to $15^{\circ}C$., and that from birch at $18^{\circ}C$."

"The oil of birch, when pure, consists simply of methyl salicylate."

"Oil of sweet birch (*Betula*), in its unrectified state, contains about 99.8 per cent. of methyl salicylate, together with a very small amount of the above-mentioned paraffin, $C_{30}H_{62}$, an aldehyde or ketone, and the ester $C_{14}H_{24}O_2$, but does not contain the alcohol $C_8H_{16}O$, which is found in *Gaultheria* oil."

"We find in both oils small quantities of benzoic acid and ethyl alcohol."

"In the natural oils of wintergreen and birch examined by me, no trace of benzoic acid could be detected, nor has sufficient evidence as yet been afforded to establish beyond doubt the presence of ethyl alcohol in these oils."

"Neither the oil of *Gaultheria* nor the oil of sweet birch contains any trace of benzoic acid or its esters, nor do they contain any terpene or sesquiterpene."

There are other results summarized in all three contributions, but they are not especially matters of dispute. In the absence of any observations of my own on the optical properties of these oils, I am willing, for the present, to accept those of Power and Kleber, who state that oil of sweet birch is optically inactive, and that oil of

wintergreen deviates the ray of polarized light — $0^{\circ} 25'$, in an 100 millimetre tube.

The results, as paralleled in the foregoing chart, show that Power and Kleber's conclusions in 1895 are much nearer Trimble and Schroeter's of 1889 than they are to those of Power in that same year.

The additional compounds separated from the hydrocarbons of these oils by Power and Kleber in no way reflect on the work of Mr. Schroeter and myself, since we first pointed out the fact that these hydrocarbons separated into a solid and liquid portion, and, in the face of figures obtained by us for a sesquiterpene, we made a reservation and predicted that a further investigation, which we could not make at that time, would show these hydrocarbons to be made up "of two or even more compounds." So far as the results of Power and Kleber, concerning these hydrocarbons, are new, I accept them until such a time as I can further study these oils.

The only vital question at issue now is concerning the presence or absence of benzoic acid and ethyl alcohol in these oils. Power and Kleber have apparently not tried the method employed by Trimble and Schroeter for the separation and detection of benzoic acid; they simply declare it absent because the acid which they separated from the oils "melted at precisely 155.5°C. ," and, I may add, at least one-half of a degree below the generally accepted melting point of pure salicylic acid.

The secret process of rectifying these oils, referred to by Power and Kleber, is not one of distillation, as presumed by them, but simply filtration through absorbent cotton; at least, that is the practice at a number of distilleries visited by me.

AN EXAMINATION OF LIME WATER AND COMPRESSED LIME TABLETS.

BY DAVID L. GREENAWALT, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 149.

To ascertain the quality of lime water as ordinarily dispensed, samples were obtained from retail drug stores located in Philadelphia and some neighboring cities and towns. These samples were examined in such manner as would decide whether they conformed to the following requirements, which the United States Pharmacopœia gives for lime water:

"It gives a strongly alkaline reaction with litmus paper."

"The alkaline reaction of the solution should entirely disappear after it has been saturated with carbon dioxide, and subsequently boiled (absence of alkalies and their carbonates)."

"Fifty c.c. of solution of lime should require, for complete neutralization, about 20 c.c. of decinormal oxalic acid V. S. (corresponding to about 0.14 [0.148] per cent. of calcium hydrate), phenolphthalein being used as indicator."

Twenty-one samples were examined.

All of the samples were found to be alkaline in reaction.

Number 1 contained alkalies.

Numbers 3, 5, 12 and 19 were cloudy when purchased.

Numbers 7, 16, 18 and 20 did not clear with excess of carbon dioxide.

Number 11 contained chlorides and sulphates, for which all of the samples were tested. Phosphates and barium were absent from all the samples.

The following table gives the number of cubic centimetres of decinormal oxalic acid volumetric solution required to neutralize 50 cubic centimetres of the sample (20 c.c. being required by the U. S. P.):

Sample.	No. c.c.	Sample.	No. c.c.	Sample.	No. c.c.
1	19.8	8	20.0	15	20.0
2	21.6	9	18.5	16	21.5
3	18.5	10	21.9	17	21.6
4	18.6	11	19.2	18	22.5
5	8.6	12	8.7	19	20.7
6	26.1	13	21.5	20	21.3
7	18.5	14	20.7	21	20.3

Two or three years ago, there were placed on the market compressed tablets and tablet triturates of lime for making official lime water by simple trituration with water.

Samples of these were procured, and, besides determining the strength of the lime water which they yielded, were examined in a general way.

The tablets and triturates were treated with water according to the directions accompanying them for preparing lime water.

None of the several samples were entirely soluble in water although number 4 was almost completely dissolved.

Fifty c.c. of the mixture, which was obtained when the tablets or triturates were rubbed with the quantity of water directed, were titrated with the oxalic acid solution. After this, some of the mixture was filtered and 50 c.c. of the clear filtrate were likewise titrated.

The following results of the titrations are stated in the number of cubic centimetres of decinormal oxalic acid volumetric solution required for the 50 c.c. titrated (20 c.c. being required by the U. S. P.):

Sample.	Form.	No. c.c. for 50 c.c. Product.	
		Cloudy.	Filtered.
1	tablet	1'2	—
2	"	16'3	8'8
3	tablet triturate	10'2	8'7
4	tablet	13'8	10'1
5	"	2'7	2'1

All of the samples contained carbonates. All were free from sulphates, chlorides, phosphates and alkalies.

Number 4 was completely dissolved by diluted hydrochloric acid; the other samples were not entirely soluble in this liquid.

Number 2 contained magnesium. Glucose was not present in any of the samples. Cane sugar was found in numbers 2, 3, 4 and 5. Starch was detected in number 5, which tablet yielded a product that had but a slightly alkaline reaction towards litmus. Traces of iron were found in numbers 2, 3 and 4.

The cane sugar had probably been introduced as a diluent in the making of the tablets. Additional quantities of this substance were added, in order to ascertain whether it would increase the strength of the lime water by dissolving any calcium hydrate that might have failed to dissolve in the water supplied; but as no such effect was observed, it would appear that the remaining calcium had assumed the form of carbonate.

The results of these examinations show that but little of the lime water dispensed is of the strength required, and that official lime water was not obtainable from any of the tablets or tablet triturates examined.

ERIODICTYON GLUTINOSUM. —

BY F. W. RITTER, PH.G.

Contribution from the Microscopical Laboratory of the Philadelphia College of Pharmacy.

Eriodictyon, or Yerba Santa, as it is more commonly known, is an indigenous shrub, which grows abundantly upon dry hills in the western and southern portions of California. It is a member of the water-leaf family, or natural order Hydrophyllaceæ. The genus *Eriodictyon* to which it belongs, is a very small one, both as to the number of species and the area of distribution. There are only four species known. The generic name *Eriodictyon* is derived from two Greek words, namely, *erion*, wool, and *diktyon*, a net; hence, so called from the finely netted or reticulated veinlets which are conspicuous on a fine woolly ground upon the lower surface. The specific name *glutinosum* has reference to the viscid character of its upper surface. *Eriodictyon glutinosum* grows to the height of from three to five feet. The leaves are alternate, and from three to six inches in length. Their general outline is oblong lanceolate, the base tapering into more or less of a petiole. The apex is acute, and the margin is irregularly serrate and beset with rigid teeth. Sometimes the margin is entire. The upper surface is green, smooth and glutinous, which is due to a resinous exudation; the lower surface is whitened between the reticulations by closely matted hairs. The texture is leathery and rigid, the venation pinnate and finely reticulate. The principal veins, which extend from the midrib toward the margin, are mostly alternate from each side of the midrib and near the margin anastomose, forming a rather distinct, wavy, sub-marginal vein. From this, short veins are continued to the margin, terminating at the apex of the rigid teeth. The margin of the dried leaf is slightly revolute, especially near the base.

Eriodictyon glutinosum was formerly known as *Eriodictyon Californicum*, and this latter name is still preferred by some botanists. The corolla is tubular funnel-form, half an inch long, thrice the length of the sparsely and slightly hairy calyx.

The plant is popularly known under various synonyms, among which may be mentioned consumptive's weed, mountain balm, saint herb, bear's weed and mountain peach. The leaves were made official in the U. S. P. of 1890. The fluid extract, which is the only official preparation, is made by percolating the leaves, reduced to a No. 60

powder, with a menstruum consisting of 4 parts of alcohol and 1 part of water. This preparation is given in doses of $\frac{1}{2}$ to 1 fluid

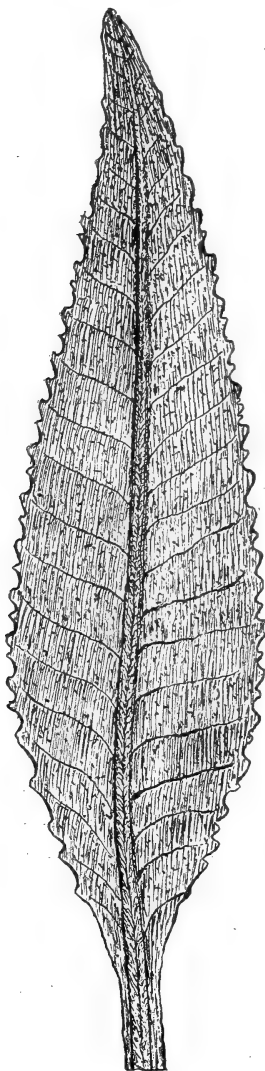


FIG. 1.

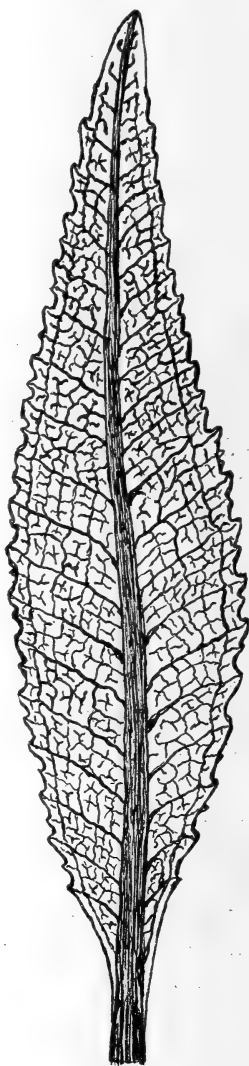


FIG. 2.

drachm (1.8 to 3.7 c.c.). An aromatic syrup and an aromatic elixir, both made from the fluid extract, have been used for some time to disguise the taste of quinine and other bitter substances. The former

is known as *syrupus corrigens*. Yerba Santa is often smoked like tobacco, the smoke being inhaled and giving relief in asthma. The fluid extract is also said to afford relief in the same complaint. The natives of the Pacific Coast have long esteemed it as endowed with rare value in all diseases of the respiratory organs. It has also been

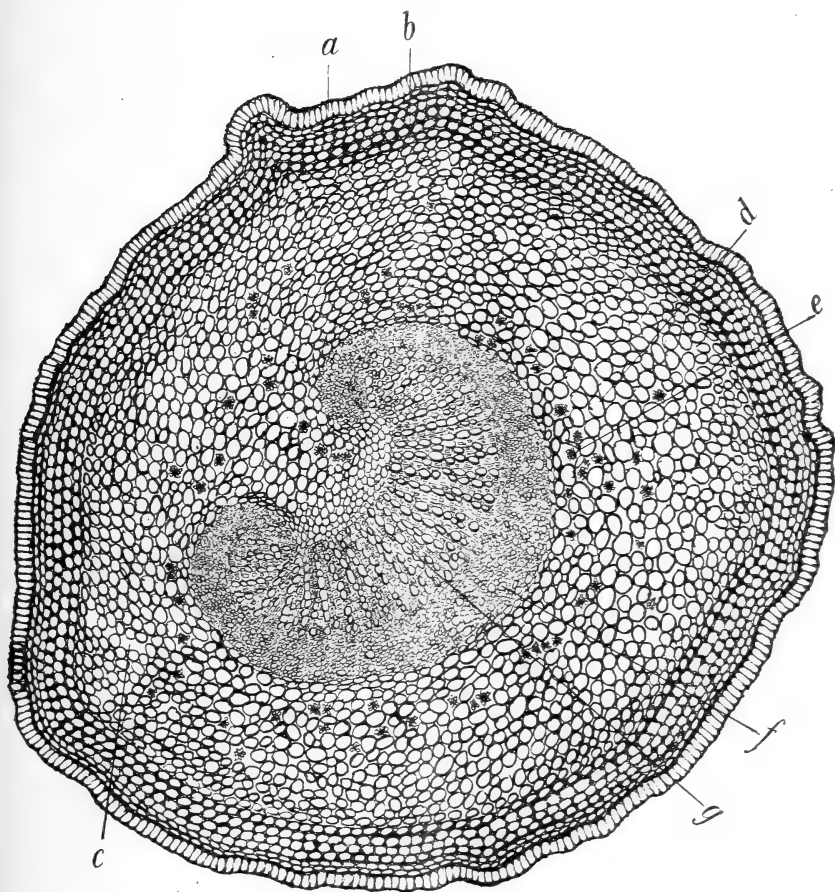


FIG. 3.

used in the form of a tea, and a solid extract has been prepared. One of the most remarkable properties of the drug is its power of completely destroying the bitter taste of quinine, and it is very often prescribed with reference to this property. The leaves have an aromatic odor, and a balsamic and sweetish taste.

The medicinal virtues of the drug are supposed to be due to its resinous matters, in which it is exceedingly rich. One investigator separated the following constituents from the drug: Two resins, one soluble in alcohol and one in ether; a bitter principle, soluble in water, and partly so in alcohol; gum; tannin; a fixed and a volatile oil; a peculiar saccharine principle and a crystalline principle, which latter was deposited from a concentrated fluid extract.

The object of this thesis, however, is not so much to describe the chemical constituents, physiological action, and preparations of the drug, as to describe the macroscopical and microscopical characters of the leaf, which is the medicinal part of the plant. The structure

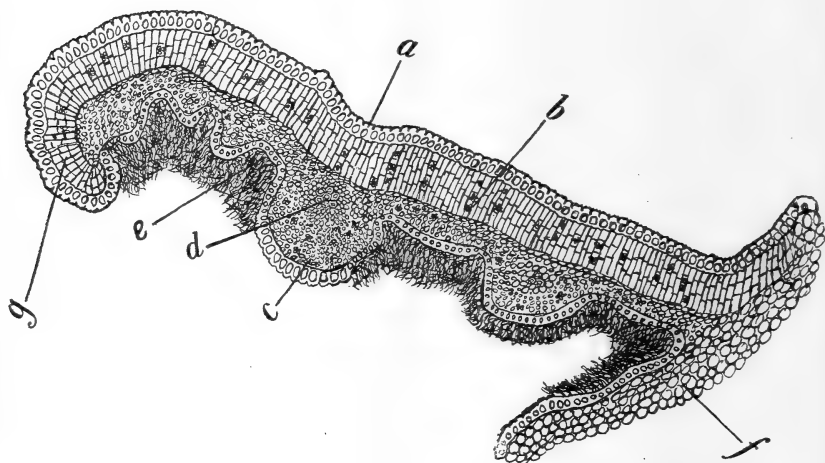


FIG. 4.

of the leaf is indicated in the drawings and descriptions which follow:

LIST OF DRAWINGS.

Fig. 1.—Upper surface of leaf, twice the natural size.

Fig. 2.—Lower surface of leaf, twice the natural size.

Fig. 3.—Transverse section of the petiole, magnified 30 diameters. *a*, the epidermis of the petiole, composed of a single layer of cells which are thickened and slightly cutinized upon their exterior surface, and presenting a fringed appearance; *b*, several layers of collenchyma or thick angled cells underlying the epidermis; *c*, intercellular spaces in the parenchyma; *d*, parenchyma tissue sur-

rounding the vasal bundle; *e*, crystals of calcium oxalate in the parenchyma cells closely encircling the vasal bundle; *f*, phloem portion of the vasal bundle facing the lower surface of the leaf; *g*, xylem portion of vasal bundle showing the radial arrangements of ducts.

Fig. 4.—Transverse section of a portion of lamina adjoining midrib, magnification, 50 diameters; *a*, epidermal cells arranged in a single layer, cells very thick-walled; *b*, layers of palisade parenchyma

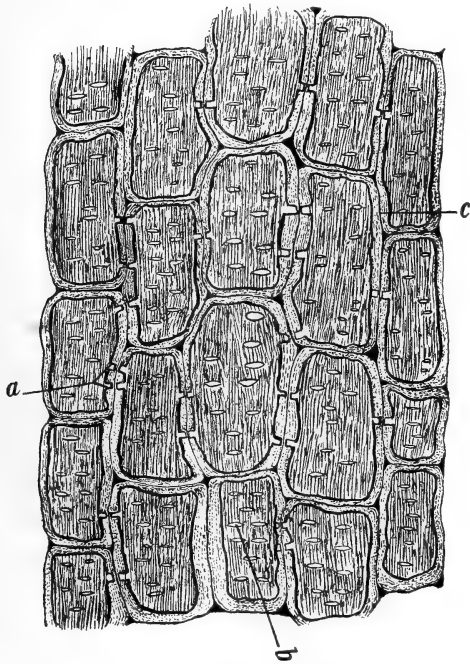


FIG. 5.

composed of several rows of cells and containing crystals of calcium oxalate; *c*, spongy parenchyma adjoining lower epidermis of leaf; *d*, transverse section through lateral vein, showing small vasal bundle; *e*, long, matted hairs upon lower surface; *f*, portion of adjoining midrib; *g*, slightly revolute margin.

Fig. 5.—Longitudinal section of parenchyma cells of midrib, magnification, 250 diameters; *a*, pit in parenchyma cells as seen in section; *b*, pits in parenchyma cells face view, longitudinal section of cells; *c*, middle lamella.

Fig. 6.—Small portion of under epidermis magnified 250 diameters; *a*, base of long woolly hair; *c*, cell contents shrunk from walls, due to treatment with alcohol; *d*, middle lamella.

Fig. 7.—Longitudinal section through the midrib; *a*, ducts of the vascular bundle, showing spirals; *b*, adjoining phloem tissue in longitudinal section; *c*, ends of ducts as seen when focus is slightly changed.

Fig. 8.—Various forms of hairs from the leaf, magnified 250 diameters; *a*, short multicellular glandular hair found upon upper

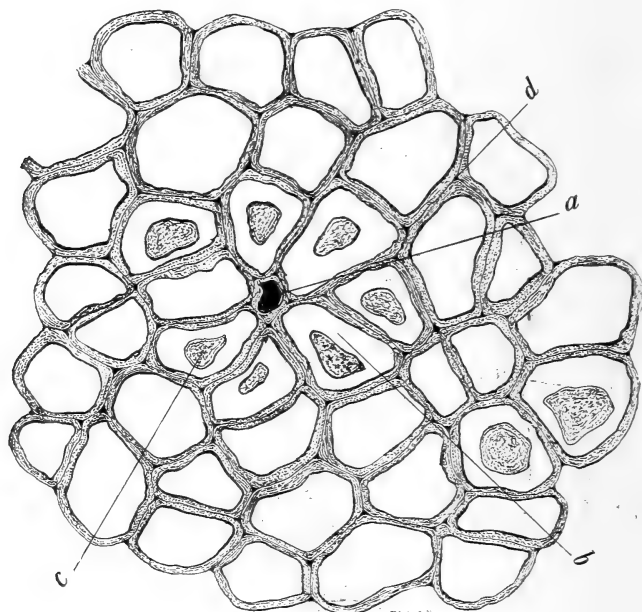


FIG. 6.

surface of blade and also upon midrib; *b*, an unusual form of hair observed upon the petiole; *c*, one of the long woolly hairs which abound upon the lower surface of leaf, and which give to it its characteristic whitish appearance.

The microscopic mounts from which the drawings were made were prepared in the following manner: The sections were made by means of the "Student's Microtome," bleached with Labarraque's solution, washed, stained with iodine green, dehydrated with alcohol and absolute alcohol, then saturated with eosin in oil of cloves and mounted in balsam.

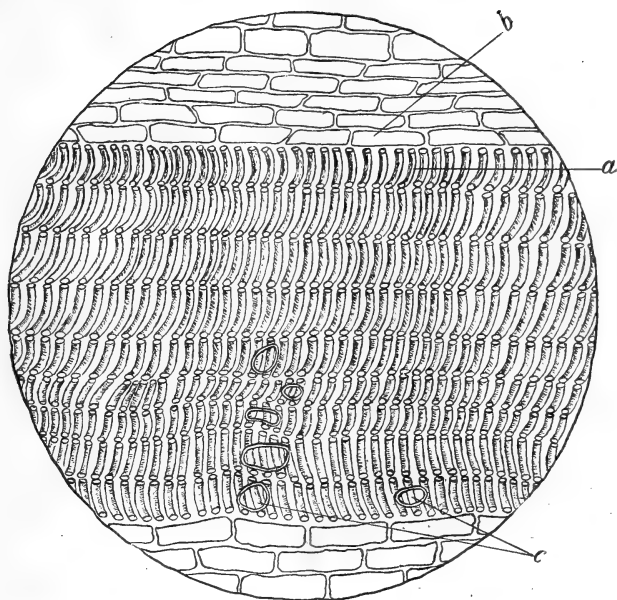


FIG. 7.

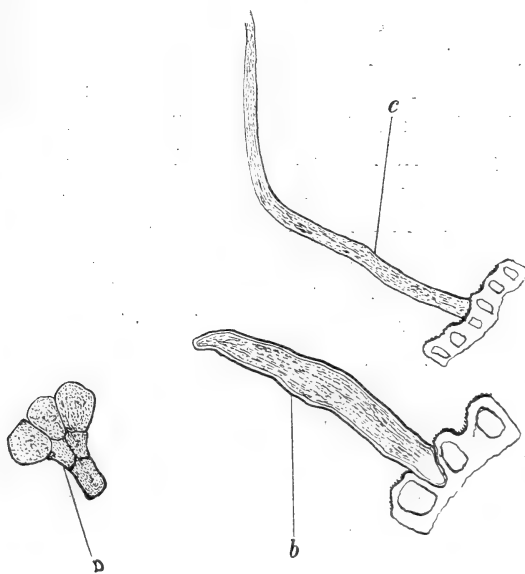


FIG. 8.

The drawings were made by the aid of the camera lucida and the magnification determined by means of the stage micrometer.

In conclusion, I take pleasure in acknowledging the kindness of Messrs. Parke, Davis & Co., of New York, and Prof. E. L. Greene, of the University of California, in providing me with the excellent specimens from which these studies have been made.

ON THE ASSAYING OF COCA LEAF, AND EXPERIMENTS WITH THE FLUID EXTRACT OF COCA.

BY LYMAN F. KEBLER.

Presented, in part, at the American Pharmaceutical Association, Denver, 1895.

Since this communication is, primarily, an investigation of the so-called Keller process, it will not be inappropriate here to call attention to an error that has crept into literature. The writer believes in giving credit to whom credit is due.

O. Schweissinger¹ and G. Sarnow were the first to apply and call attention to the advantages possessed by a mixture of chloroform and ether in assaying galenical preparations. They applied the method, practically as we now have it, to various fluid extracts, two years before Keller's contributions appeared. Mr. Keller² duly gives the above authors credit, and, furthermore, says: "Es eignet sich für alle alkaloidhaltigen Präparate, ja es lässt sich sogar (selbstverständlich mit gewissen Modificationen) für Rohstoffe anwenden." Mr. Keller has simply applied the process to the drug itself, with a slight modification. Mr. Keller certainly deserves credit for his modification, but it should not be forgotten that Schweissinger and Sarnow are the authors of this process.

Keller's method having for some time yielded unsatisfactory results in standardizing the fluid extract of coca leaf, the writer determined to investigate the reliability of the method when applied to coca leaves and its preparations. A sample of coca leaves was reduced to a No. 40 powder, and assayed by all the well-known methods. The following gravimetric and volumetric results were secured by these processes:

¹ 1890, *Pharm. Centralhalle*, 31, 771.

² 1892, *Schweiz. Wochenschr. f. Chem. u. Pharm.*, 30, 501.

Methods.	Per cent. of Alkaloids, Gravimetrically.	Per cent. of Alkaloids, Volumetrically.
Squibb ¹	0.75	0.67
v. d Marck ²	0.64	0.485
Pfeiffer ³	—	0.58
Lyons ⁴ (general)	0.503	0.481
Lyons ⁴ (ether)	0.523	0.516
Lyons ⁴ (benzine)	0.51	0.34
Lyons ⁵ { ether, 25 parts } { benzine, 70 parts }	0.72	0.521
Keller ⁶ (4 hours maceration)	0.56	0.532
Keller (24 hours maceration)	0.62	0.563

In order that a method may be of the greatest practical value, it must be easily executed, extract the largest percentage of alkaloids possible in a comparatively short time, and at the same time be neat. Dr. Squibb's method extracts the largest per cent. of alkaloids, but requires too much time. Marck's method requires too much time, and yields unsatisfactory results, volumetrically. Pfeiffer's process is adapted for volumetric work only. While this method gives fairly satisfactory results, it is inelegant, and great care must be exercised to remove all of the caustic soda. Lyons' general method of assay, and the one in which ether is the principal solvent, are quite satisfactory. The benzine method is inaccurate. The method, as modified by Messrs. Caspari and Dohme, yields good results. The Schweissinger-Sarnow method, as modified by Keller, yields the most satisfactory results. Several other methods were tried, but were never finished, on account of the stubborn emulsions formed.

In concluding this part of the work, it is only necessary to say that Keller's method has proven itself superior to Lyons' method in extracting a slightly larger per cent. of alkaloids, and is less prone to emulsify.

Mr. Dohme presented a paper, at the last meeting of the Ameri-

¹ 1885, *Ephemeris*, 2, 784.

² 1889, *Nederl. Tydschr. v. Pharm. Chem.*, April; *Analyst*, 14, 115.

³ 1887, *Chem. Ztg.*, 11, 783 and 818.

⁴ *Pharmaceutical Assay*, § 29-36, 154-157.

⁵ 1893, *AM. J. PHARM.*, 65, 478.

⁶ 1892, *Schweiz. Wochenschr. f. Chem. u. Pharm.*, 30, 501; *AM. J. PHARM.*, 65, 78.

can Pharmaceutical Association on the same subject. While we, ultimately, arrive at the same conclusion, the writer cannot agree with Mr. Dohme that Keller's process is so vastly superior to all other processes of assay.

The next step was to percolate a portion of the leaf according to the official process for preparing a fluid extract. This fluid extract yielded 0.43 per cent. (grav.) of alkaloids by Keller's process. The marc was then dried and assayed by the same process, and yielded 0.16 per cent., or a total of 0.59 per cent., against 0.62 per cent., the total amount of alkaloid contained in the crude drug by the same process (grav.).

These results prove (1), that the above process extracts the alkaloids as completely from the fluid extract as from the drug itself; and (2), that diluted alcohol does not extract the drug completely, even when well percolated.

Experiments were next undertaken to determine the conditions most favorable for extracting the active principle of coca leaf in preparing the fluid extract. In each experiment 100 grammes were percolated with 120 cubic centimetres of the menstruum.

The following table embodies the condition under which the experiments were performed and the results obtained:

Fineness of Powder.	Menstruum.	Per cent. of Alkaloids in Fluid Extract. Grav.
No. 12	65 per cent. alcohol	0.19
No. 40	65 per cent. alcohol	0.29
No. 40	Diluted alcohol ¹	0.21
No. 40	Diluted alcohol	0.20
No. 12	Diluted alcohol	0.18

¹ Acidulated with one-tenth of a per cent. of tartaric acid.

The drug assayed by Keller's process: No. 12 powder, 4 hours 0.20 per cent.; 24 hours, 0.32 per cent. No. 40 powder, 4 hours, 0.21 per cent., and 24 hours, 0.32 per cent.

These results show that a 65 per cent. alcoholic menstruum extracts the alkaloids better than diluted alcohol, and a moderately fine powder is better than a very coarse one. These facts have been demonstrated on a large scale since the experiments were made. The acidulation does not facilitate extraction. It is unfortunate that a low assaying leaf was operated on, but the facts remain the same.

A CONTRIBUTION TO THE CHEMISTRY OF AUSTRALIAN MYRTACEOUS KINOS.¹

BY J. H. MAIDEN, F.L.S., AND HENRY G. SMITH.

Read before the Royal Society of N. S. Wales, June 5, 1895.

In the investigations that have been carried out at the Technological Museum during the last few years, on the exudations of the Australian Myrtaceæ, it has been found that these substances, known as kinos, fall into three classes, which have been respectively named the ruby, gummy and turbid groups. The members of the first of these are soluble both in alcohol and water, giving a ruby-colored solution; those of the second are practically insoluble in alcohol; and the third, when treated with hot water, and allowed to cool, contain a body or bodies which render the liquid turbid.

We now deal with kinos belonging to this last group, the present investigation having been carried out with the view to identify the substances causing the turbidity already referred to.

In the papers already published² it was suggested that this body was catechin for the following reasons: it was mostly dissolved in boiling water, but separated again on cooling; it gave an intense purple color with concentrated sulphuric acid (in the case of the precipitate of the Eucalyptus kino tested); it gave a yellow color with caustic potash. For these reasons, which are admittedly inconclusive, the substance was at the time considered to be catechin. Work on these kinos has been since proceeded with.

At the recent meeting (January, 1895) of the Australasian Association for the Advancement of Science, held at Brisbane, Dr. Lauterer, of that city, read a paper on "Queensland Native Astringent Medicines." In this paper, which has since been published,³ the writer seeks to show that the substance causing turbidity in kinos is ellagic acid. As the presence of ellagic acid has not been detected by us in kinos, we considered that the time had arrived when the results of our experiments in this connection might be usefully published. We announce before this society the separation of two new organic substances—eudesmin and aromadendrin, the latter name being used provisionally—to the presence of which, either singly or in company, the turbidity of some kinos is due.

¹ Abstracted by J. C. Peacock.

² Proc. Linnean Society, N. S. W., 2, VI., 389 (1891).

³ *Chemist and Druggist* of Australasia, 1895, p. 108.

We have restricted our researches to a typical *Eucalyptus kino* belonging to the turbid group, namely, that of *Eucalyptus hemiphloia*, F. v. M., and also that of *Angophora lanceolata*, Cav., as the exudations of this genus closely resemble some of the members of the turbid group of *Eucalyptus kinos*.

Eudesmin can be easily obtained crystallized and in a pure state by the method about to be described.

When the kino of *Eucalyptus hemiphloia* is finely powdered and treated with ether in a dry state, practically nothing is taken into solution; but if a small quantity of water is added to the fine powder and gently heated, a thick paste is formed. If, on cooling, this paste be transferred to a separator, ether added and well agitated, it partly goes into solution, the ether presenting a yellow color. By repeated agitation, removal of the ethereal layer, addition of fresh ether, and repetition of the process for about two days, the greater portion of the substances soluble in ether are removed, no emulsion being formed. The ether used in these successive extractions is mixed, distilled off at a low temperature, and the residual mass, partly resinous-looking and partly crystalline, is digested in absolute alcohol (in which it is readily soluble with the aid of heat), transferred to a beaker and allowed to cool. If only a very small quantity of the alcohol has been added, nearly the whole of the eudesmin will crystallize out. These crystals can be transferred to a filter, washed with rather dilute alcohol to remove the amorphous resinous-looking body, and transferred to a porous substance to drain. After recrystallization, the appearance of the body is that of a pure white mass, with a lustre resembling spermaceti. It is necessary that the successive filtrates obtained from these crystals be placed in a vessel to allow of the slow evaporation of the alcohol, so that the remaining crystals of eudesmin may form and so be removed, or the filtrates may be evaporated to dryness, and again treated with absolute alcohol with the aid of a gentle heat, and the previous process repeated. If care is taken in the manipulation, it is possible to almost entirely remove eudesmin from these solutions, and so separate it from the resinous-looking body, which is readily soluble in even dilute alcohol.

The crystals of eudesmin, which are obtained by slowly evaporating an alcoholic solution, are rhombic prisms; larger crystals are obtained by slow crystallization from amyl alcohol; these crystals

extinguish parallel to the principal axis and polarize at times in bright colors. They show faces of the right rhombic prism with brachypinakoids. The termination planes are mostly macrodomes, pyramidal faces not having yet been detected. The formula, therefore, is:

$$(\infty P + \infty \bar{P} \infty + \bar{P} \infty).$$

The eudesmin crystallized from absolute alcohol was found to be anhydrous. When it is dissolved in hot alcohol, water added until the slightest precipitate appears to form, and the solution left to stand for some hours, beautiful acicular crystals are obtained, in some cases, of nearly half an inch in length.

Eudesmin is soluble in hot water, but crystallizes out again on cooling. It melts on the surface of mercury at 99° C. into a whitish resinous-looking mass, partly transparent; and on this account, care must be taken not to raise the temperature too rapidly or too high when determining its solubility in water, as it fuses into a globular mass. It is also soluble in ether, acetic ether and chloroform, but not in benzol, petroleum spirit or bisulphide of carbon. Its solutions in water and alcohol are neutral in reaction.

Aqueous or alcoholic potash solutions exert but slight solvent action on eudesmin, either in the cold or on warming. Glacial acetic acid dissolves it, and the addition of water causes it to separate.

Eudesmin is odorless and almost tasteless, being very slightly sweetish. When ignited it readily burns with a very smoky flame. Concentrated sulphuric acid dissolves eudesmin with the production of a dark color, which changes to purple; after standing some time or when water is added, this color fades and a dark precipitate separates. Eudesmin is soluble in strong nitric acid with a beautiful yellow color; after a time dendritic forms of a light yellow color make their appearance, and continue to increase until the alteration is completed. These reactions with sulphuric and nitric acids appear to be characteristic.

Fuming nitric acid behaves like strong nitric acid, except that it dissolves the eudesmin with explosive violence. It is to these alteration and decomposition products that we must eventually look to determine the molecular constitution of eudesmin.

To ascertain the chemical composition, two combustions were

made. The percentage results obtained were practically the same in both cases :

	Mean of Two Combustions.	Calculated for $C_{26}H_{30}O_8$
Carbon	66.2050	66.383
Hydrogen	6.5225	6.383
Oxygen	27.2725	27.234
	<hr/> 100.0000	<hr/> 100.000

From the results of these combustions we may consider $C_{26}H_{30}O_8$ as the empirical formula of eudesmin.

The kino of *Angophora lanceolata* does not appear to contain eudesmin.

As eudesmin is soluble in hot water and but slightly in cold water, this property, of course, indicates that it assists to give turbidity to aqueous solutions of kinos; but the large proportion of a resinous-looking body extracted by ether, and left on removal of eudesmin, points to the fact that eudesmin is not the only substance that causes this turbidity.

As before mentioned, it has been stated emphatically that the substance causing this turbidity is ellagic acid. We will submit that ellagic acid is not present in either the kino of *Eucalyptus hemiphloia* or in that of *Angophora lanceolata*. The ready solubility in boiling water of the precipitated substances on cooling from a hot aqueous solution of the kino, by itself tends to indicate that the substance cannot be ellagic acid, as this acid is practically insoluble in water even on boiling. Its ready solubility in alcohol also tends to indicate that it is not ellagic acid. As the precipitated powder causing the turbidity when the kino of *Angophora lanceolata* is treated with water has been particularly mentioned as consisting of almost pure ellagic acid, and as the kino of *Angophora lanceolata* does not appear to contain eudesmin, a portion of the above precipitated powder (from cold water) was decomposed by fusing with potash. The products of decomposition were found to be protocathechuic and acetic acids, which points to the fact that the powder was not ellagic acid.

The protocathechuic acid is readily obtained in a crystalline state by removing the volatile acids from the solution acidified with sulphuric acid, with petroleum spirit, and then agitating with ether.

We subjoin a tabular statement of the reactions obtained with ellagic acid, freshly prepared from divi-divi (pods of *Cæsalpinia*

coriaria), and with the precipitate from the kino of *Angophora lanceolata*, prepared exactly in the same way, namely, by concentrating a solution of the material in alcohol, pouring into water, filtering, washing, dissolving in alcohol, again filtering, and evaporating to dryness.

ELLAGIC ACID FROM DIVI-DIVI.

Strong HNO_3 dissolves with reddish to crimson color; on adding H_2O , light yellow is produced.

Fuming HNO_3 dissolves, forming a red color, not so crimson as preceding.

KOH dissolves dark yellow.

H_2SO_4 dissolves instantly to a beautiful purple, becoming purplish black on standing.

Boiled with H_2O , very little dissolves; the solution, when treated with Fe_2Cl_6 , gives a purple color, changing to blackish (ink).

The dried powder, placed in Fe_2Cl_6 solution, soon becomes bluish black; on standing, becomes more black.

When a solution in alcohol is evaporated, a crystalline deposit is formed, easily seen under the microscope.

As ellagic acid has as yet only been detected in substances which give pyrogallol on decomposition, the substances (tannates) obtained by precipitating the aqueous solution of *Eucalyptus hemiphloia* kino (from which the bodies soluble in ether had been removed) with neutral acetate of lead, and also that obtained by adding basic acetate of lead to the filtrate from the first precipitate, were taken. The lead from these precipitates was removed by sulphuretted hydrogen and the filtrates evaporated to dryness.

By heating these two tannins in glycerin for half an hour, at 200°C ., the decomposition product was in both cases catechol, and not

REPUTED ELLAGIC ACID FROM
ANGOPHORA LANCEOLATA.

Strong HNO_3 slightly dissolves, forming a light yellowish color.

Fuming HNO_3 dissolves, forming a dark, reddish-brown color; on adding H_2O , a yellowish, resinous-looking body separates.

The same.

H_2SO_4 dissolves instantly, forming a yellow color, which becomes dark brown on standing.

Boiled with water dissolves entirely, precipitates again on cooling; when heated with Fe_2Cl_6 , dirty green color and dirty green precipitate are formed.

The dried powder, placed in Fe_2Cl_6 solution, becomes greenish brown, becoming greener on standing.

Solution in alcohol dries mostly as an amorphous varnish or dull powder, not crystalline, as seen under the microscope.

pyrogallol, and a yellowish, resinous-looking body, difficultly soluble in cold water, but soluble in boiling water, was also removed by the ether at the same time.

This reaction shows that the tannic acid was not one likely to give ellagic acid as a decomposition product.

When portions of these same tannins were heated in a closed tube for one hour, at 100° C., with dilute hydrochloric acid, a body in appearance allied to one of the red decomposition products known as kino red, elm red, hemlock red, etc., is obtained as a product of decomposition. From these results, although we might be inclined to look for two tannic acids, we must conclude that there is but one tannic acid in the kino of *Eucalyptus hemiphloia*.

As the whole of the tannin of *Angophora lanceolata* kino is precipitated by neutral acetate of lead, we may infer the same also of this kino, the decomposition products of the tannin obtained from the lead precipitate being catechol when decomposed by heating at 200° C. for half an hour, and protocatechuic acid and acetic acid when decomposed by fusing with potash.

From the decomposition products of the tannins from *Eucalyptus hemiphloia* kino, and from *Angophora lanceolata* kino, we consider them identical.

As already stated, there is a resinous-looking substance extracted with eudesmin by ether from the kino of *Eucalyptus hemiphloia*. As this is soluble in boiling water (with difficulty, as it melts into greasy-looking masses), but separates again on cooling, we must consider that this substance also plays a part in the turbidity of this kino as well as eudesmin. This body, when allowed to precipitate from boiling water, is removed from the aqueous solution by agitating with ether, the liquid becoming quite clear, demonstrating that the whole of the bodies causing this turbidity have been removed. As the ether slowly evaporates, crystals form at the junction of the ether and water; these fall through the liquid to the bottom of the vessel, either by themselves or when the vessel is gently agitated. We have only just succeeded in crystallizing this substance, to which we have given provisionally the name aromadendrin, and a subsequent communication will be made to the Society when its chemistry has been worked out.

As seen under the microscope the crystals are plates. In the early state of crystallization the rhombus is the principal form, but,

as they become larger, they form six-sided plates. These polarize most beautifully in bright colors. Aromadendrin crystallizes from boiling water in plates. Ether dissolves it, although not readily; the ethereal solution dries into an almost amorphous substance. Alcohol dissolves it easily.

One determination was made of the melting point; it was found that the crystals melted on the surface of mercury at 162° C.

Its color reactions are as follows, and from the results at present obtained it appears that the characteristic color reaction previously given to ellagic acid, of forming a crimson color with fuming nitric acid, will have to be modified, as the body of which we now write gives this crimson reaction most beautifully clear and pure, not only with fuming nitric acid, but with nitric acid even when slightly diluted. Potassium hydrate gives a bright yellow color, which is permanent in the air even until it is dried up. Sulphuric acid dissolves it yellow, becoming brown on standing. Ferric chloride solution has but little color reaction with the crystals of aromadendrin.

The distinctive color reactions given by eudesmin and aromadendrin serve at once to distinguish them in the absence of any determinations of crystalline form.

The chemistry of the substance causing the turbidity in the kino of *Angophora lanceolata* will form the subject of a later communication. We have succeeded in isolating a few well-developed crystals of the body.

CULTIVATION OF THE COCO-NUT.¹

Soil and Climate.—A moist, tropical climate, with good and somewhat sandy soil, near the sea, is the best for the growth of the coco-nut palm. If the tide rises so that the sea may flow in daily over the plantation, so much the better, but drains must then be made, so as to allow the water to run off freely.

Sowing.—Ripe, dry nuts only should be used, and the very largest that can be obtained. Nuts for seed should be gathered from trees that are mature, but not too old, and kept dry for five or six weeks before planting. The nursery bed should be made under slight shade, such as that of the coco-nut palm; it should be thoroughly dug to a depth of two feet, and the soil well mixed up with

¹ From the Bulletin of the Botanical Department, Jamaica, 2, 182.

ashes and coarse salt. At the beginning of the season's rains the nuts are put into this seed-bed on their side, at a distance of one foot apart, and so that about two inches appear above the surface. The nursery-bed should be kept damp, but not too wet. It is a good plan to transplant them into other beds at two feet apart when they are from two to six months old.

Transplanting.—When the seedlings are from six months to two years old they may be transplanted to their permanent positions in the plantation, at distances from each other of twenty feet. Pits should be dug for them, as large as three feet every way in poor soil; ashes and salt are useful additions to any soil, and it may be necessary to give also a top-dressing of manure, which should not be dug in. They should be shaded by bananas or plantains for two years.

Tillage and Manuring.—The Jamaica nuts are very small, and do not give much "meat" as compared with those from Central America, India and Ceylon. This may be due partly to unfavorable conditions of soil, climate, etc.; but much might be done to improve the fruit by careful selection of nuts for seed, and a liberal treatment of the trees in the plantation by tillage and manuring. It is calculated that in India there are 480,000 acres under the coco-nut, and the cultivation is attended to carefully. In Bombay, for instance, after the seedlings are planted out, they are watered every day or two for the first year, every two or three days for the second and third years, and every third day for the fourth and fifth years. "During the rains, from its fifth to its tenth year, a ditch is dug round the palm and its roots cut, and little sand-banks are raised round the tree to keep the rain-water from running off. In the ditch round the tree, 22 pounds of powdered dry fish manure is sprinkled and covered with earth, and watered if there is no rain at the time. Besides fish manure the palms get salt-mud covered with the leaves of the croton-oil plant, and after five or six days with a layer of earth; or they get a mixture of cow-dung and wood ashes covered with earth, or night-soil, which, on the whole, is the best manure." (Watt's Dict.)

In the tropics of the old world generally, it is customary, when the plant is one year old, to dig round the roots and apply ashes once a month; when the tree is two years old, to open up every year, at the beginning of the rains, the roots to a distance of four to

six feet from the stem, to apply ashes and dry manure to the roots, and leave the opening until the end of the rainy season; then to fill in again the soil which has been removed, and level the ground. During the time the roots are exposed, the older worn-out rootlets may be cut away and the roots of other plants removed. Cattle should on no account be allowed in the plantation, as it is most hurtful to the tree to have the leaves bitten, and if the unfolded leaf is injured the tree dies.

Yield.—A tree in good condition yields from fifty to one hundred nuts every year, but good climate, soil and cultivation may bring the yield up to as many as 200 nuts.

The following paragraph is a part of a speech delivered by the Marquis of Ripon, K.G., late Secretary of State for the Colonies of Great Britain, at the anniversary dinner of the Linnean Society. It is a good thing to be honest enough to acknowledge ignorance, but how a Secretary of State for the Colonies could have escaped hearing something of gambier is a mystery.

I had a curious proof the other day of the way in which plants of great value may be but little known to those who do not cultivate science, or are not engaged in those industries in which these plants are employed. I received a deputation from Leeds. Though most of you probably think only of Leeds as an important place for the production of cloth, yet there is a great leather trade in Leeds besides, and this deputation of leading men came to me to do what I could to help to increase the production of gambier. They told me they could not get on without it, that it was absolutely essential to their industry, and that it came shipped to them from Singapore. I believe the largest quantity is not grown in Singapore, but comes from the native states beyond. I am bound to say that until I had received this deputation, I had never heard of gambier. I knew nothing about it.

The interest of this paragraph lies not in the ignorance of the official, but in the information it gives of the growing scarcity of gambier. If that deputation of citizens of Leeds should turn to the United States, they would learn that we have a substance here called canaigre, prepared from the roots of *Rumex hymenosepalus*, that will sooner or later displace gambier which is of uncertain origin, uncertain quality and uncertain effect.

The verification of the existence of the true *Juan Fernandez Sandal Wood* is recorded in the *Kew Bulletin* for 1894, page 110; and the receipt of a specimen (page 372) from Professor F. Philippi, who described it from very imperfect material. Thanks to Mr. Söhrens, Kew now possesses excellent dried specimens of this most interesting plant (*Santalum fernandezianum*) collected by the donor himself. The following is an extract from Mr. Söhren's letter on this subject:

"It may be interesting to you to know that, after many years' search, only one live tree of the sandal wood has been found, which was in flower in the middle of April. The height of the tree to the first branch is 5.4 metres. The nearly horizontal branches prevented my measuring the total height, which may be about 8 metres; circumference, 1.5 metres at 0.5 metres from the ground."

EDITORIAL.

ANIMAL CHARCOAL, AS A PILL EXCIPIENT.

Señor Eviclé, in *Revista Farmaceutica Argentina*, has contributed an article on the foregoing subject, which deserves more than passing attention. There is no doubt that animal charcoal is an excellent absorbent; but before it is adopted as a pill excipient it would be just as well to inquire whether its active absorbing property is not an objection. In the article referred to, for a translation of which we are indebted to the *Pharmaceutical Journal* of October 5th, the following formula is offered:

Beech creosote	I gramme.
Tannin (prepared with ether)	I "
Iodoform	I "
Make twenty pills.	

To quickly get a satisfactory and smooth mass, first absorb the creosote with animal charcoal as previously directed, add the tannin and iodoform triturated together, mix well and mass with Venice turpentine. Pills thus prepared may be sent out rolled in magnesia, silvered or varnished with tolu varnish, which latter helps to mask the caustic taste of the creosote, although the animal charcoal does this to a great extent.

It strikes us that this is a step in the wrong direction in the administration of medicine, for if the pills made according to this formula should be absorbed in the stomach or intestines it would indicate a greater power of these organs than they usually get credit for. Possibly a more resistant pill mass might be made, but if so, we don't remember to have heard of it.

Animal charcoal may have a claim as a constituent of certain pill masses, but it should be so compounded with the other ingredients as to make a mass that would readily disintegrate in the liquid contents of the stomach.

CREOSOTE OR CREASOTE?

Joseph Ince contributed a paper on this subject to the *Pharmaceutical Journal* of October 12th, in anticipation of the issue of the Imperial Pharmacopœia. His citation of authorities is quite extensive, but he has apparently overlooked an important contribution on the same question by Charles Rice in the *AMERICAN JOURNAL OF PHARMACY*, April, 1894. Dr. Rice practically exhausted the subject, and presented overwhelming reasons for adopting "creosote." If there is any doubt in the minds of the compilers of the British Pharmacopœia on this matter, they should by all means read Dr. Rice's remarks.

H. C. Myers, Ph.D., has undertaken the directorship of a department of pharmacy, recently established in the University of Washington, at Seattle. Dr Myers attended the session of 1886-87, at the Philadelphia College of Pharmacy, and then went to Europe, where he studied chemistry, first at Göttingen and later at Strassburg, where he took his degree. He has been for some time instructor in chemistry at Stanford University.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

ETIDORHPA, OR THE END OF THE EARTH. The strange history of a mysterious being and the account of a remarkable journey, as communicated in manuscript to Llewellyn Drury, who promised to print the same, but finally evaded the responsibility, which was assumed by John Uri Lloyd, with many illustrations by J. Augustus Knapp. Author's edition, limited. Published by John Uri Lloyd, Cincinnati, O., 1895.

If it be asked what pharmacy has to do with a volume having the foregoing title, the answer may be given that it contains many scientific matters woven into the thread of the story in a way to make it especially attractive to all thinking pharmacists; then, too, Professor Lloyd, whom we may designate as the sponsor, if not the writer, of the volume, is, or has been, associated with pharmacy in all its phases. He has most creditably prepared his part of the work, and produced a book which will be externally, as well as internally, an ornament to any library.

The body of the work is a manuscript which was communicated to one Llewellyn Drury, of Cincinnati, thirty years ago, who for some reason failed to make it public, and the duty has devolved upon Professor Lloyd. The manuscript details the wanderings of a man who was abducted from his home for publishing the secrets of the society to which he belonged, and who was taken on a long journey into the mysterious regions of the earth's centre. We are told that the story has more truth than fiction in it, and the ingenious selection for its principal character bears this out, for many will recognize him as William Morgan, of Freemason fame, who was abducted at Batavia, N. Y., in 1826.

The story, interesting as it is, must take second place in considering the value of the work, for so much science and philosophy have been moulded into it as to make it worthy of a reading for these alone. Since we have nothing more than the most superficial knowledge of what constitutes the interior of our globe, a journey to its interior recesses furnishes room for the widest kind of speculation, and we return from the voyage with the belief that all our knowledge of everything is as superficial and unsubstantial as the mere film of the earth's crust, which has been explored by man.

There has never been any book like this one written. If it be said to resemble some of Jules Verne's works, the distinction may be drawn that "Etidorhpa" is logical; no miracles were performed to extricate the traveller from the numerous perilous positions in which he found himself, but, on the contrary, he was always released by what appeared to be perfectly rational methods. The physical phenomena described are apparently without a flaw, and some new principles, notably the diffusion of liquids of different densities through porous media, are enunciated, and will stand the test of actual experiment, as the writer of this review knows from having tried them. The chemistry of the work is faultless—so different from that to which we are treated by most literary writers, who usually disgust one with their bad nomenclature and impossible chemical reactions.

The subjects treated are such as require the most careful handling, for many of them border on the unknowable, and it is only by the most acute reasoning that the author prevents the story from becoming "top heavy," but he has succeeded by the most plausible methods. Materialists will derive little con-

solation from the book, and spiritualists will find but little more comfort, for both are treated to a mild vein of sarcasm that is all the more searching because of its freedom from bitterness.

The author has ventured to discuss many things which few writers in the past have dared to undertake. We are told that "matter is retarded motion," and this is demonstrated by the most acute process of reasoning. He also dares to denounce the hypothetical ether which scientists have invented to account for the transmission of heat, light, etc., and declares there is no need for it. It is impossible, in a review, to give the details of how these ends are attained, but the book itself must be studiously read, not once, but twice or thrice. The vivid description of the drunkard's den, and the masterly portrayal of the effects of certain narcotics are the products from a writer of extraordinary resources.

In the words of the author, we may say "to many this manuscript will prove a passing romance, to others an enigma, to others still it will be a pleasing study," and we might add that those who get anything out of it will be required to study it. The author is at once a scientist and a philosopher; he has also shown himself to be a master of a peculiarly beautiful literary style which, in some chapters, may be termed word-painting of the highest order; in fact, the book is full of figurative gems like the following: "As all the bubbles in a glass shrink and vanish when the first collapses, so the troupe of fairy-like forms before me disintegrated and were gone." We have no authority for making the statement, but, in our opinion, there is but one name possible in connection with the authorship of this mysterious book, and that is John Uri Lloyd.

A HANDBOOK OF INDUSTRIAL ORGANIC CHEMISTRY. Adapted for the use of manufacturers, chemists and all interested in the utilization of organic materials in the industrial arts. By Samuel P. Sadtler, Ph.D., F.C.S. Second (revised and enlarged) edition. Philadelphia: J. B. Lippincott Company, 1895. Pp. 537.

Something over three years ago the first edition of this work was reviewed in this JOURNAL. Since that time the author has collected considerable new material and amplified that already written. The valuable bibliography has been carefully brought to date, and the statistics, wherever obtainable, have been revised to the present year. It is needless to say that these two features alone greatly add to the value of the volume.

The general treatment of the several industries, as adopted in the first edition, has been continued, viz.: (1) enumeration and description of the raw material; (2) the processes of manufacture; (3) the products, both intermediate and final; (4) the most important analytical tests and methods; (5) bibliography and statistics. When an industry has been written up in the order of these headings, the subject is practically exhausted.

Among the numerous additions, we note one which will be appreciated by pharmacists, namely, the enlargement of the chapter on soaps, so as to include those manufactured for toilet purposes.

Considerable new material has been added to the chapter on oils; the "chrome tanning" process has been included in the processes of manufacturing leather, and the chapters on the textile industries have been considerably amplified. The appendix has been enlarged by a table on the physical and chemical properties of the fixed oils and fats. Some two years ago, the

first edition of this work was translated into German, in the face of the fact that there were already a large number of works on the same subject in that language. We believe the second edition will be still more popular than the first one, and that it will fill a place in the chemical literature of the United States that is not occupied by any other book.

HANDBOOK OF WEST-AMERICAN CONE-BEARERS. By J. G. Lemmon, Temescal, near Oakland, Cal. Third edition. Published and for sale by the author, at \$1 per volume.

The author of this work is carrying on a labor of love for the subject in which he is engaged.

His book is all the more interesting on that account.

Situated in a locality which is particularly rich in cone-bearing trees, he has, by actual observation, been able to classify the sixty members of the order, and suggest reasonable and appropriate common names for the trees which are now loaded with a confusion of terms, or else are neglected altogether.

The preface opens with the statement of a theory for the occurrence of so many species of cone-bearing trees on the Pacific Coast; an appeal is then made for good English names. The author does not propose these to supplant the Latin names; he believes the public are not yet ready for the latter, and that the selection and application of suitable, descriptive and distinguishing names will gradually aid in popularizing the scientific names.

The body of the book is made up of a classification, brief description, and in part illustration of the cone-bearers.

The descriptions are concise and well chosen; the following, concerning the great sugar pine, *Pinus Lambertiana*, will serve to illustrate this:

"The great sugar pine is the accepted, the crowned prince of the pine family. Not only by virtue of its unexcelled dimensions and the magnitude of its cones is it regal, but it is a most kingly monarch in its majestic, lofty bearing, its erect, self-asserting dignity, and its bowed head, obedient to its only masters—the powers above. Only the supreme emperor of the whole vegetable world, the immense *Sequoia*, also a denizen of our great Sierra forest, and admitting the sugar pine to fellowship, excels in dimensions (every way but in fruit) this noble, dominant tree of the whole Western world."

This tree is of interest to pharmacists because of the peculiar manna-like secretion which exudes scantily from the injured trees, hence the name, sugar pine.

The plate illustrations—seventeen in number—illustrate the principal characters distinguishing tribes, genera and species. They have mostly been taken from water-color paintings by Mrs. Lemmon.

The book is very readable, and should be in the possession of every one interested in the products of our Pacific Coast.

KURZES HANDBUCH DER KOHLENHYDRATE. Von Dr. B. Tollens. Zweiter Band (enthaltend die Forschungsergebnisse der Jahre 1888-1895). Breslau: Verlag von Eduard Trewendt, 1895.

The short handbook of the carbohydrates, by Dr. Tollens, which appeared in 1888, was a reprint in book-form of the original article which he had contributed to Ladenburg's *Handwörterbuch der Chemie*, and was instantly

accepted as a most convenient and satisfactory reference book on this most important class of compounds. As the author says in the preface to this second volume, "the efforts of chemists to investigate more closely the nature of the carbohydrates have been extraordinarily numerous, and they have been followed by success in all respects." Especially does he refer in this statement to the remarkable work of Emil Fischer on synthetic formation of the sugars. Hence, material has accumulated in such amount as to make the present volume larger than the one issued in 1888. The theory of the carbohydrate groups, as developed and expanded by Emil Fischer in connection with his synthetic work, is first taken up and very satisfactorily stated; the newer methods for determination of molecular weight mentioned, and the results of their application to the sugars and starch, and the most recent results on the optical properties of the individual sugars, as well as their chemical reactions, are given.

The body of the book then takes up in detail the compounds belonging to the three great groups, monosaccharides, disaccharides and polysaccharides. The alcohols, like mannite, corresponding to the sugars and the acids derived from them by oxidation, are also considered in detail.

A very complete enumeration of journal references, covering thirty pages, and an excellent index, serve also to make the book one eminently useful to the student in this chemical field. We do not know of any book which will serve as an authority on this subject better than this new work of Prof. Tollens'.

S. P. S.

A MANUAL OF ORGANIC MATERIA MEDICA, being a guide to *materia medica* of the vegetable and animal kingdoms, for the use of students, druggists, pharmacists and physicians. By John M. Maisch, Ph.M., Phar.D., late Professor of *Materia Medica* and Botany in the Philadelphia College of Pharmacy. Sixth edition. Revised by Henry C. C. Maisch, Ph.G., Ph.D. Philadelphia: Lea Brothers & Company, 1895. Pp. 526.

The fifth edition of this work was revised by Professor Maisch a short time before the appearance of the recent revision of the *United States Pharmacopœia*. A number of additions and alterations have therefore been necessary, and this part of the work has been very creditably done by the reviser of the present edition. We cannot refrain, however, from expressing regret that photomicrographs have been employed for the new illustrations. Possibly the fault has been in the process of reproduction, but certain it is that they compare very unfavorably with the beautiful engravings which make up the greater number of the illustrations. If subsequent editions receive the same careful revision that has characterized the sixth, this work will stand as a lasting monument to the scientific and literary accuracy of the late Professor Maisch.

A LABORATORY MANUAL OF ORGANIC CHEMISTRY. By Dr. Lassar-Cohn, Professor of Chemistry in the University of Königsberg. Translated with the author's sanction from the second German edition, by Alexander Smith, Assistant Professor of General Chemistry in the University of Chicago. London and New York: Macmillan & Co. 1895. Price, \$2.25. Received from John Wanamaker, Philadelphia.

In adding one more volume to the already long list of laboratory manuals, the author had in mind the practical side of the subject. We usually learn from the works on this subject that have previously appeared, the methods of prepa-

ration, the reactions involved and the properties and reactions of the product; but this work deals especially with the methods.

Part I treats of general methods, in which one chapter is devoted to each of the following subjects : Baths, Crystallization, Decolorizing of Liquids, Distillation, Drying Solids and Liquids, Extraction, Filtration, Determination of Melting Points, Determination of Molecular Weights, Sealed Tubes, Sublimation.

Part II treats of special methods, in which one chapter is devoted to each of the following subjects : Condensation, Preparation of Diazo Bodies, Preparation of Esters, Fusion with Caustic Alkalies, Preparation of Halogen Compounds, Oxidation, Reduction, Preparation of Salts, Saponification, Preparation of Sulphonic Acids, Remarks on Organic Analysis.

It is just such a book as every chemical student should be familiar with before commencing research work, and then he should have it within a convenient distance for reference.

BERICHT ÜBER DIE THÄTIGKEIT IM PHARMACEUTISCHEN INSTITUT, DER KAISERL. UNIVERSITÄT DORPAT IN DER ZEIT VOM 1. JANUAR, 1885, BIS 9. DECEMBER, 1894. Von Prof. Emer. Dr. G. Dragendorff. St. Petersburg, 1895.

In this JOURNAL, 1885, p. 318, is a review of a former publication of this kind, reporting the progress of the Pharmaceutical Institute of the University of Dorpat, under the direction of Professor Dragendorff, from 1865 to 1885. The present pamphlet of 23 pages continues that account down to the close of 1894, which was about the time he retired. It shows an increase in the attendance of students much greater than that of its predecessor. In 1885 the annual attendance of pharmaceutical and medical students amounted to 341, and in 1894, 634. During this time the number of pharmaceutical students has more than quadrupled, while the number of medical students has decreased somewhat. A concise account of the investigations conducted by the students is included, followed by a list of the dissertations and other publications.

JAHRESBERICHT ÜBER DIE FORTSCHRITTE AUF DEM GESAMMTGEBIETE DER AGRIKULTUR-CHEMIE. Neue Folge, 17, 1894. Edited by Dr. A. Hilger and Dr. Th. Dietrich, with the assistance of numerous collaborators. Berlin: Paul Parey. 1895.

This volume is up to the usual standard of excellence. It is especially complete on the subject of plant constituents.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES. A yearly report of the progress of the general sanitary sciences throughout the world. Edited by Charles E. Sajous, M.D., and seventy associate editors. Illustrated with chromo-lithographs, engravings and maps. Five volumes. The F. A. Davis Company. Philadelphia, New York and Chicago.

The 1895 issue of this comprehensive work compares favorably with its predecessors. The articles contributed are by acknowledged specialists.

The following chapters in the several volumes are popular in character and would be found of interest by the general public as well as by the physician :

Vol. II. Inebriety, Morphinism and Kindred Diseases. By Norman Kerr, M.D.

Vol. III. Anæsthetics. By B. Dudley Buxton, M.D.

Vol. IV. Legal Medicine and Toxicology. By Frank Winthrop Draper, M.D. Bacteriology. By Harold C. Ernst, M.D.

VOL. V. General Therapeutics and Pharmaceutical Chemistry. By B. G. Dujardin-Beaumetz, M.D., and H. Dubief, M.D. Histology and Microscopical Technology. By Charles E. Sajous, M.D. There are numerous other excellent articles, but they are more technical in character.

HÆMATOBLASTS AND BLOOD PLATELETS. By Dr. M. L. Holbrook. Reprinted from the Proceedings of the American Microscopical Society. 1894.

ANALYSES OF CEREALS, collected at the World's Columbian Exposition. By Harvey W. Wiley. Bulletin No. 45, U. S. Department of Agriculture, Division of Chemistry. 1895.

THE PROCEEDINGS OF THE TWELFTH ANNUAL CONVENTION OF THE NATIONAL CONFECTIONERS' ASSOCIATION OF THE UNITED STATES, held at Saratoga, New York, July 9 and 10, 1895.

SOUTHERN JOURNAL OF PHARMACY AND MATERIA MEDICA.—This is the latest addition to the pharmaceutical press of the country. It is issued monthly, at Nashville, Tenn., and the first number presents a good, clean appearance. We are told "by way of preface," that "The primary object of this publication is to serve as a source of information regarding those subjects which are comprised in its peculiar field, and as a means of dissemination of ideas pertinent thereto; to act as a medium for the exchange of views among those interested, and to aid, so far as possibilities permit, in the improvement of pharmacy proper." The editor is Robert C. Bicknell, M.D., Ph.G., and the publisher, Franc. M. Paul.

CATALOGUES.

REGISTER OF ALUMNI AND ANNUAL ANNOUNCEMENT OF THE SCHOOL OF PHARMACY, UNIVERSITY OF MICHIGAN. Twenty-eighth year. Ann Arbor, 1895-96.

CHICAGO COLLEGE OF PHARMACY. Thirty-ninth announcement, 1895-96.

STATE UNIVERSITY OF IOWA, DEPARTMENT OF PHARMACY. Announcement for 1895-96.

UNIVERSITY OF KANSAS. Catalogue of the School of Pharmacy for 1894-95, and announcement for 1895-96.

TWENTY-FIFTH ANNUAL ANNOUNCEMENT OF THE LOUISVILLE COLLEGE OF PHARMACY. Session of 1895-96.

THE BROOKLYN COLLEGE OF PHARMACY. Fifth Annual Announcement, Session of 1895-96.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 15, 1895.

The first of the series of Pharmaceutical Meetings for 1895-96 was held in the Museum of the College. Mr. Joseph W. England presided, and the minutes of the last (June) meeting were adopted as reported in the July number of this JOURNAL.

The papers and talks, and the discussions which followed, were particularly interesting and instructive. The first paper on *Granulated Opium*, prepared by Messrs. Lyman F. Kebler and Chas. H. LaWall (see p. 554), was read by

the latter. Mr. England inquired how granulated opium is made, and Mr. LaWall, replying to this query, said that the process is a commercial one and more likely to be used by those handling large quantities of the drug, and that the product contains no diluent, whereupon he called attention to a sample which had been prepared by Mr. Kebler. Mr. George M. Beringer stated that the sample of granulated opium exhibited was very similar to the coarsely powdered opium that he had been using for several years for the preparation of camphorated tincture of opium, wine, etc. He had prepared the same by cutting the moist opium into small pieces and setting these aside in a warm place until sufficiently dry to powder. It was then coarsely powdered in a mortar and passed through a No. 20 or 30 sieve, until uniformly mixed. In the official process for tincture of opium, calcium phosphate and powdered opium (No. 80) are directed. He had frequently found the calcium phosphate of the market alkaline and at other times containing a large proportion of calcium carbonate. This admixture might possibly be the cause of the loss of morphine reported in the finished tincture. He saw no advantage in the use of the granulated opium in the preparation of the tincture, over the use of the gum opium. He recommended beating the gum opium, after being cut into small pieces, in a mortar with warm water until reduced to a uniform mixture, macerating with requisite amounts of alcohol and water, and percolating, the tincture to be assayed and standardized to a uniform percentage of morphine. Mr. LaWall further remarked that the calcium phosphate which he used in his experiments was not alkaline, and that he had made some experiments with talcum which gave practically the same results. He also stated that the large manufacturers assay the finished tincture. Mr. England showed a sample of moist Persian opium, which had been presented to the College by Mr. S. G. Rosengarten, and which assayed 15 per cent. of morphine, this high-grade opium being imported solely for the manufacture of the alkaloid. Mr. Kebler said that there must have been some mistake made in the abstract of Prof. Hemm's report on tincture opium, which appeared in the August number of the *National Druggist*, as Prof. Hemm, in a communication to him, had attributed the loss of alkaloid, reported by him, to be due to the method of percolation rather than to the mode of assay. Mr. England inquired of Mr. Kebler which method he used in estimating calcium meconate, whereupon the latter replied that he employed both the titration and the combustion methods.

Mr. England exhibited and described a new poison bottle, which was somewhat novel in design. The bottle has an aluminum screw top, the upper part of which is open for the insertion of a stopper, and on removing this it is found that another stopper is securely inserted, and that the most expeditious way of getting at the contents of the bottle is to unscrew the cap. Mr. England was of the opinion that this device could be regarded merely as an aid in securing the caution and care necessary in handling poisons.

The next paper, entitled *Additional Notes on Black Sulphur*, was read by Mr. Kebler, see p. 559.

Mr. Beringer referred to a new use for "Black Sulphur," and that was as an insecticide in the protection of trees, and he also stated that a company had been organized in the New England States to manufacture it for this purpose. The method of using it was to bore a hole into the tree and place therein some of the powder, afterward closing the opening. The State right for the sale of the

article in New Jersey had been purchased for \$6,000, but the fraud has been detected, and this alleged compound will not attain the commercial importance its manufacturers had, no doubt, anticipated.

Mr. Beringer then gave a talk on the *Eucalyptus species*, referring more particularly to those grown in the United States. He said that this genus is the most distinctive of the natural order Myrtaceæ, to which it belongs. The leaves on the older plants vary in shape and size, and, like all the other members of that order, are characterized by an intra-marginal vein, and also by their pelucid-punctate appearance. The seed leaves are round, oval or cordate, opposite and horizontal, but, on development, becoming scythe- or scimeter-shaped and turned on edge so as to be vertical, and alternately arranged. The flowers are white, red or yellow, but never blue, and are peculiar in that the sepals unite to form a lid or operculum covering the stamens until the time of anthesis, when the lid drops off and the stamens appear more or less exserted. The shape of the lid is an important means of distinguishing the different species, as is also the surface where it is broken off. The shape of the calyx in bud and fruit and the venation and shape of the leaf are also very important means of distinguishing the species. These plants are indigenous to Australia and Tasmania, and the number of species is said to be about 140, with many varieties. Professor Bentham, who has made a study of them, considers the shape of the anthers and the manner of discharging the pollen two important characteristics. Baron Ferd. von Mueller has stated them to be the most difficult to study of any of the Australian plants, with the exception of the acacias, certain species of which yield the wattle barks. The trees are known by such vernacular names as gum tree, fever tree and stringy bark tree, iron bark, messmate, and the *Eucalyptus gunnii* as the cider tree. They are noted for their rapidity of growth as well as the height which they attain, the *Eucalyptus amygdalina* attaining a height of over 400 feet in their native country. There are 44 species now grown in the United States, at the California Forestry Station, at Santa Monica. Of these, specimens of 40 species had been obtained by Mr. Beringer, and were exhibited. These plants, produced from the seed, after seven years' growth, are developed so as to produce fruit. Several important products are yielded by these trees, namely, a kind of resin or kino used for tanning and coloring purposes, and the wood for carpentering and fuel. A company has been organized in California for the manufacture of the leaves into an extract as an anti-incrustator for boilers. The oil is also obtained in this country by distillation, and the eucalyptol extracted by distillation or chemical means, the oil from *Eucalyptus globulus* yielding 75 per cent. of eucalyptol, and that from *Eucalyptus amygdalina* yielding phellandrine. The former alone should be used for medicinal purposes. The leaves of another species, *Eucalyptus citriodora*, develop, on drying, an odor resembling citronella, and would likely prove of commercial importance. The *Eucalyptus globulus* is utilized for planting around the orange groves in California to protect against winds, and now is the common kindling wood of the lower portion of that State.

Some plants not yet two years old were sent by Prof. Henry Trimble, and had been grown in a greenhouse in this city from seeds which he had procured from Baron von Mueller. They belonged to the species *macrocarpa*, and were quite healthy in appearance, and exhibited the leaf characteristics of the genus.

The Eucalyptus globulus is easily acclimated, and has attained in this country a height of from 50 to 70 feet in a few years. Mr. Evan T. Ellis wished to know their latitude of growth, upon which question Mr. Beringer remarked that they were quite easily acclimated, and that Eucalyptus alpina could probably be grown in the higher climates, and that different species could be adapted for different altitudes.

Mr. England said that he had heard it stated by physicians that the anti-malarial effects attributed to them were due to their power of absorbing moisture rather than to the emanations from them, to which opinion Mr. Beringer partly assented, believing that they acted in a dual capacity, and referred to the fact that in Italy these trees had been successfully used to reclaim large tracts of the most malarial marshes.

Prof. Edson S. Bastin described some plants which had been grown by Prof. Babcock at the Chicago Botanical Gardens, and remarked, in this connection, that the beneficial influence of these trees is due to the ozonizing effects of the oil, as is the case in pine districts, and that the statement of the quantity of water evaporated by them was probably exaggerated, and that they do not surpass, in this respect, other plants comparing with them in size.

Mr. Beringer spoke of the enormous underground development of some species, which would account for their absorption of water.

Prof. Bastin also referred to the intense heat and long seasons of drought in Australia as being causes which changed the shape of the leaves from their ancestral forms, as indicated by the younger leaves. Stomata exist on both sides of the leaves in equal number, and the vertical arrangement is probably due to the inherited result of heliotropism or the influence exerted by the sun.

Prof. Joseph P. Remington spoke of the rapid growth of some plants which were grown in Horticultural Hall after the Centennial Exposition in 1876.

After this discussion Mr. Kebler gave an abstracted report of *Assays of Coca Leaves* and experiments with the fluid extract of coca, which he had conducted. His paper, embodying a report of the work, is published in this number of the JOURNAL, page 572.

Mr. Kebler showed quite a number of samples of beeswax. One of these contained 90 per cent. of paraffin, another both rosin and paraffin, and one sample contained a substance which he, as yet, had not been able to identify. Mr. Kebler would be glad if any one having time for the work would undertake the investigation of this unknown substance and report upon it.

Mr. Ellis said that when he was in business in 1875, tallow was the only adulterant looked for, and was detected by simply chewing the wax.

On motion, adjourned.

THOS. S. WIEGAND,
Registrar.

The first shipment of *manganese ore* from Cuba to Philadelphia has recently been reported by Consul Hyatt, at Santiago de Cuba, to the Department of State at Washington. It will be a matter of interest to manufacturers of steel to know that this first shipment was made by the Pompo Mining Company, which has a capacity of 200 tons per day, but the demand for ore from this country is beyond their capacity to supply. The supply of this ore has heretofore come principally from the Black Sea region of Europe.

MINUTES OF MEETING OF MEMBERS OF THE
COLLEGE.

SEPTEMBER 30, 1895.

The regular meeting of members of the College was held this day, Charles Bullock presiding. Twenty-five members were present. The minutes of last stated meeting were read and adopted. The minutes of meeting of Board of Trustees for September were read, and on motion approved. The Committee on Delinquent Members submitted the following report :

To the Philadelphia College of Pharmacy.

GENTLEMEN :—Your committee, appointed at the last meeting, to whom was referred the subject of delinquent members and of an associate membership, would report that these have been considered. Regarding the first matter, delinquents, we are not yet prepared to submit a final report.

The suggestion for the reintroduction of associate membership meets our approval, and we recommend that the by-laws of the College be amended to permit of this being effected. To meet this requirement we offer the following amendment : To substitute for Chapter VIII, Article V, of the by-laws, the following :

Article V. Any graduate of a pharmaceutical college, chemist, apothecary or manufacturer residing in the United States and conforming in his professional conduct to the code of ethics adopted by this College, may be elected as an associate member.

Associate members shall each pay a contribution of \$3 annually in advance. They shall be permitted to use the reading room and library, subject to such rules and regulations as the Library Committee may adopt, and to have access to the museum and collections, and to participate in the scientific meetings and work of the College, and receive such publications of the College as are distributed to members ; but they shall have no right to vote or hold office.

Any associate member may, upon written request and nomination, be elected to active membership when his associate relation shall terminate, and upon the return of his certificate of associate membership, he shall receive a certificate as an active member.

GEORGE M. BERINGER,
WM. E. KREWSON,
WILLIAM B. THOMPSON.

On motion, the report was accepted and the recommendation to amend Chapter VIII, Article V, of the by-laws, by the substitution of the above article, was directed to lie over, under the rules, until the next meeting of the College, to be then taken up for final consideration. The report of delegates of the College to the sessions of the American Pharmaceutical Association, held at Denver, in August last, was presented by Prof. Remington.

On motion to proceed to election of trustees for three years (three) and (one) for the unexpired term of Edward C. Jones, deceased, tellers reported the unanimous re-election of Howard B. French, E. M. Boring and Alonzo Robbins, and for the unexpired term, Mahlon N. Kline. Prof. Trimble submitted a list of candidates for the positions of honorary and corresponding members, which was directed to be referred to the Board of Trustees for action.

On motion, meeting adjourned.

WILLIAM B. THOMPSON, *Secretary.*



THE AMERICAN JOURNAL OF PHARMACY

DECEMBER, 1895.

SOME FURTHER OBSERVATIONS ON CHERRY BARKS. —

BARK OF THE WESTERN FORM OF PRUNUS VIRGINIANA, LINNÉ.

BY EDSON S. BASTIN.

In Brewer and Watson's Flora of California this is treated as a distinct species, under the name of *Prunus demissa*, Walters; but Prof. C. S. Sargent regards it as only a form, not even a distinct variety, of the Choke cherry, *Prunus Virginiana*. It is somewhat less diffuse, and more tree-like in habit, though seldom attaining a height of more than 12 feet. Its leaves are pubescent underneath instead of smooth, their bases frequently somewhat cordate instead of wedge-shaped, their texture rather more leathery, and the fruits are usually less astringent than those of the Eastern form. Differences such as these, however, are certainly not specific, especially as the Eastern form is known to vary considerably in the shape, texture and hairiness of its leaves and in the color and astringency of its fruit. If Prof. Sargent's view be correct, the Choke cherry is, as he says, the most widely distributed of any American species of tree, for, to quote his language: "It grows within the Arctic Circle, ranging across the continent from Labrador and the shores of Hudson's Bay to the valley of the Mackenzie River, in latitude 62°, and crossing the Rocky Mountains, reaches the Pacific Coast in Northern British Columbia; it extends southward through Eastern North America to southern Georgia, Louisiana, Texas, northern Mexico and along the mountain ranges of Western North America.

"In the Eastern States it is one of the most common of the large tree-like shrubs, growing usually along the margins of the forest, generally in rich, rather humid soil, and along highways and fence-

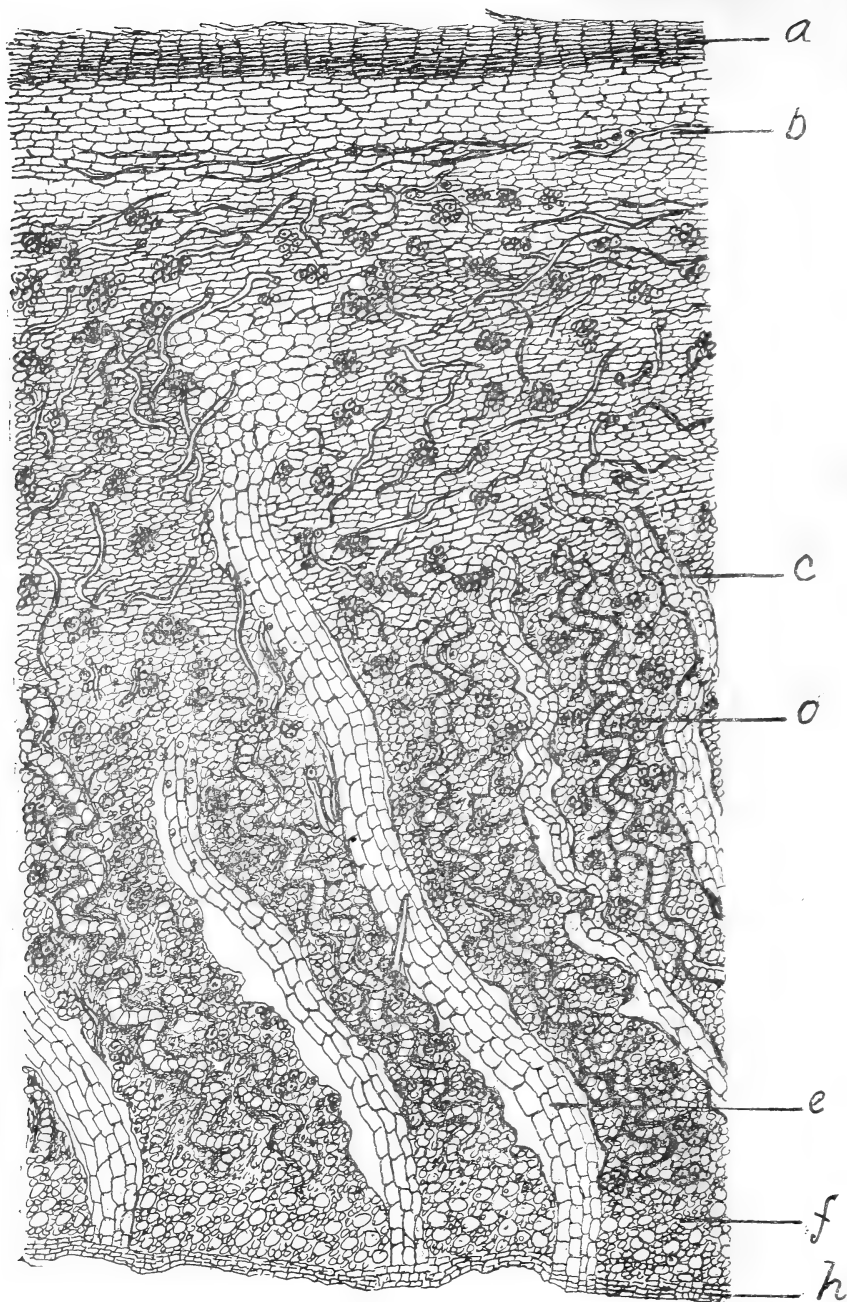


FIG. 1.—Cross-section of bark of *Prunus demissa*, magnified 100 diameters.

rows; in southern Oregon and northern California it inhabits low valleys, where, in rich, moist soil, in the neighborhood of streams, it attains a large and arborescent habit; on the mountain ranges of the interior of the continent, where it is confined to elevated valleys, in southern California, and at the northern and southern limits of its range, it is a low shrub." (The Silva of North America.)

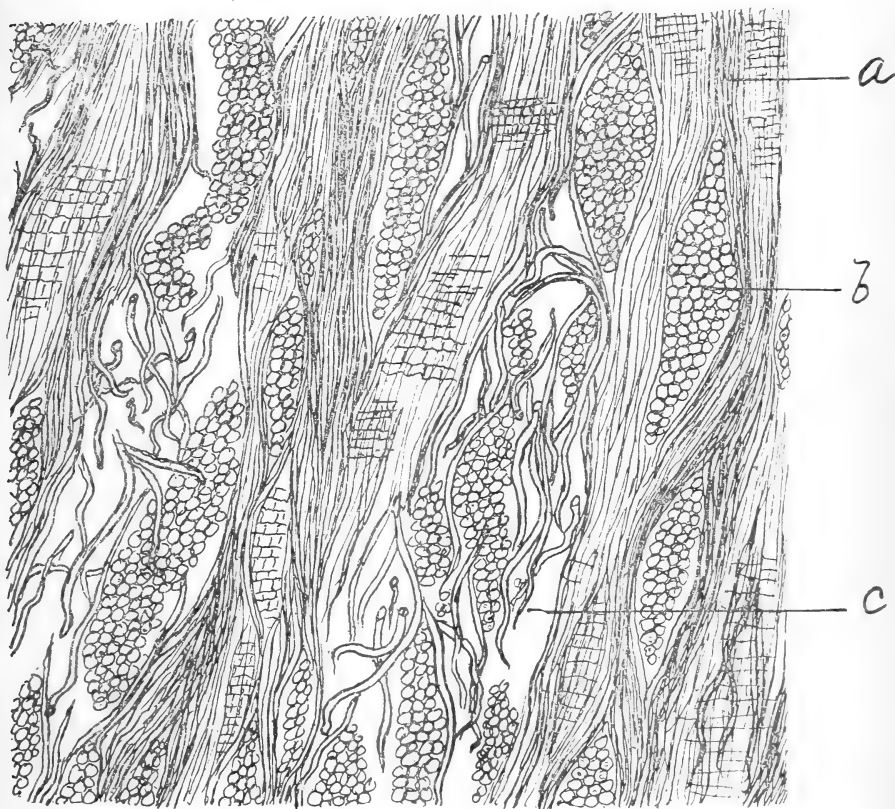


FIG. 2.—Longitudinal-tangential section of inner bark of *Prunus demissa*, magnified 100 diameters.

The specimens of bark examined by me were kindly supplied by Miss Alice Eastwood, of the California Academy of Sciences, and were obtained from Marin County, in that State.

To the taste these specimens were less bitter, but quite as aromatic as good specimens of the bark of *Prunus Serotina*, excelling

in the latter respect any specimens of *P. Virginiana* that the writer has before tested. This difference can easily be accounted for by differences in climatic conditions. No differences were observable between the bark of the Eastern and Western forms in the external markings, excepting the purely accidental one that the bark of older stems in the Western form was mostly covered with growths of crustaceous lichens, decking the surface with grayish and whitish patches and blackish dots and lines. The fracture and the color of the interior surface correspond closely with those of our Eastern form.

Furthermore, a microscopic study does not reveal any considerable differences between the Western form and ours. The slight differences revealed by the drawings may well be due to the widely dif-

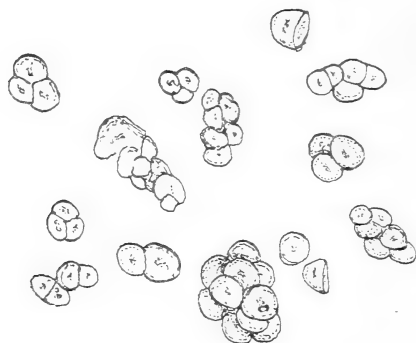


FIG. 3.—Starch from the bark of *Prunus demissa*, magnified 1,200 diameters.

ferent conditions of growth. There are the wavy and oblique medullary rays that characterize all the species of the group; but, as in our Choke cherry, the rays are less oblique than in the other species thus far studied. The bast areas between the rays show wavy, compressed sieve-tissues, with walls in the older portions, irregularly thickened, and numerous long, slender, lignified bast fibres arranged irregularly, singly or in clusters. These fibres are frequently not straight, but wavy, particularly in the neighborhood of the medullary rays.

Beyond the extremities of the medullary rays, in the cortex or middle bark, occur also numerous sclerenchyma fibres, a fact which was noted in my previous description of our Eastern form. These

fibres are either clustered or single, and irregularly distributed. They are commonly wavy, and their position may be transverse or oblique, as well as lengthwise of the bark.

Stellate masses, as well as single crystals of calcium oxalate abound in all parenchymatous portions of the bark.

Starch in small quantities was also found in the parenchyma. As in other cherry barks, it is very small grained, but it differs from those in the others thus far studied, in the fact that the grains are mostly compound, the masses often consisting of a dozen or more granules. The hilum of the individual granule is usually quite distinct and is centrally located.

The fact that the Western and Eastern forms are not to be regarded as distinct species, or even as distinct varieties, does not preclude the possibility that the former may be richer in medicinal constituents. Indeed, its more aromatic taste and odor suggest that it is so, and that it might repay chemical investigation.

DESCRIPTION OF FIGURES.

Fig. 1, transverse section of the bark of the Pacific Coast form of *Prunus Virginiana*, magnified 100 diameters; *a*, periderm; *b*, sclerenchyma fibres in cortex; *c*, a secondary medullary ray; *d*, bast fibres; *e*, a primary medullary ray; *f*, later formed phloëm elements; *h*, cambium tissue.

Fig. 2, longitudinal section of the same, made in a tangential direction well toward the outer layer of the bast; *a*, bast fibres; *b*, medullary ray near its outer extremity; *c*, fissure, with loosely arranged and much contorted bast fibres. Magnification, 100 diameters.

Fig. 3, starch grains from the same, magnified 1,200 diameters.

AGAR-AGAR AS A BASE IN GLYCERIN SUPPOSITORIES.

BY FRANK G. RYAN.

Contribution from the Pharmaceutical Laboratory of the Philadelphia College of Pharmacy.

Some months ago, E. Lomuller published in *Il Giornale di Farmacia*, a formula directing the use of agar-agar in the preparation of glycerin suppositories.

It was claimed that this substance produced a more satisfactory product than did gelatin, and, on that account, no doubt, the proposed formula has been reprinted in a number of American and foreign journals. But, as no comparison was made between the

qualities of the suppositories made with agar-agar and with sodium stearate, which is so largely used in this country, the writer decided to investigate the matter.

Agar-agar is a substance obtained from several species of algæ. It is known, also, as Japanese isinglass. (See United States Dispensatory, seventeenth edition, pages 724 and 1638).

The formula published was as follows :

Agar-agar	10 grammes.
Distilled water	200 cubic centimeters.
Glycerin	200 grammes.

Dissolve the agar-agar in the water by the aid of heat, constantly stirring, add the glycerin, and strain while hot.

Following these directions, the writer prepared a sample of suppositories from the given quantities. The suppositories, therefore, contained 50 per cent. of glycerin. They were very elastic, and had not sufficient firmness to admit of being easily introduced into the rectum. Such an article would hardly be received with much favor by the physicians of this country. A sample of suppositories containing 75 per cent. of glycerin was then made. These were firmer than those containing 50 per cent., and could be used without much difficulty; however, they did not possess the firmness of those made with sodium stearate.

An attempt was made to produce suppositories stronger than 75 per cent., but it was without good results, as the glycerin had a tendency to separate from the mass upon cooling.

In making the suppository mass it was found better to change the manipulation somewhat. The agar-agar was first soaked with cold water, and the latter expressed. After calculating the amount of water retained, sufficient to supply the proper amount was added. The glycerin was then added, and the whole heated on a water-bath until the agar-agar was dissolved, after which the solution was strained.

The following formula may be used by these directions for a suppository mass containing 75 per cent. of glycerin.

Agar-agar	5 grammes.
Distilled water	45 cubic centimeters.
Glycerin	150 grammes.

On account of the smaller quantity of glycerin contained and the elasticity of the mass, I do not consider the product of this method

one that could be used to replace the glycerin suppository now in common use.

The suppositories made with agar-agar have, however, these advantages: they easily leave the moulds, and are not affected to the same extent by exposure as are those containing sodium stearate.

No experiment was made to ascertain the value of the suppositories made with agar-agar as a laxative.

CALX SULPHURATA. —

BY IRWIN A. BECKER,

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 150.

The United States Pharmacopœia of 1880 directed *calx sulphurata* to be prepared by heating together finely powdered lime and precipitated sulphur, but in the revision of 1890, the official process was made to consist in heating dried calcium sulphate with charcoal and starch. The Pharmacopœia of 1880 fixed the strength of the preparation as containing not less than 36 per cent. of calcium monosulphide; the revision of 1890 describes the product as containing at least 60 per cent. of that substance.

The method of estimating the calcium monosulphide is the same now as in the former revision, and depends upon the complete precipitation of the copper from a definite amount of copper sulphate by a weight of the product which, if it be of full strength, should contain sufficient of the calcium monosulphide to convert all of the copper into insoluble copper sulphide.

With the view of ascertaining whether or not the manufacturing chemists had adopted the increased strength of the lately enforced Pharmacopœia, samples were procured from New York, Philadelphia and St. Louis, and examined by the following official directions: "If 1 gramme of sulphurated lime be gradually added to a boiling solution of 2.08 grammes of cupric sulphate in 50 c.c. of water, the mixture digested on a water-bath for fifteen minutes, and filtered when cold, no color should be imparted to the filtrate by one drop of potassium ferro-cyanide T. S. (presence of at least 60 per cent. of pure calcium monosulphide)."

When the samples were treated in this manner it was found that in no case was 1 gramme of the sample sufficient to completely pre-

precipitate the copper, for in all cases the supernatant liquid possessed a green color. It having thus been proven that none of the samples were of full official strength, sufficient of the sample was added to supply the deficiency and fulfil the indication of complete precipitation, in order to ascertain the exact amount of calcium monosulphide present.

The quantity required for this purpose was determined by supplying it from a known weight and deducting from this the weight of the unused portion.

The table gives the amount in grammes of each sample needed for the official test, as also the corresponding percentage content of calcium monosulphide.

Sample.	Amount Required.	Percentage of Calcium Monosulphide.
U. S. P.	1'000	60'00
1	1'277	45'52
2	1'303	44'45
3	2'358	24'85
4	1'386	41'59
5	1'621	35'73

Sample No. 5 was received wrapped in three papers; the middle one was parchment paper. The other samples were in small cork-stoppered vials, sealed with paraffin and capped with foil.

Sample No. 3 was not claimed by the manufacturer (who was aware that this comparison was to be made) to be the official substance, but merely a crude calcium sulphide. If we exclude this sample on account of what has just been said, we still have the remaining four, showing percentages nearer to 36, the amount ordered by the Pharmacopœia of 1880, than to the 60 per cent. at present required.

TUBULAR PRISMATIC CRYSTALS. —

BY LYMAN F. KEBLER.

Monobromated camphor furnishes us with crystals of at least two particular habits, prisms and scales. Exactly what it is that determines the habit of a crystal is not known. Experiments appear to indicate that impurities exert a powerful influence on the forms of

crystals developed. The presence of sodium hydroxide in a solution of sodium chloride may cause the latter to crystallize in octahedra instead of the usual cubes, and the presence of the same agent in a concentrated solution of common alum conduces to the formation of cubes instead of the customary octahedra.

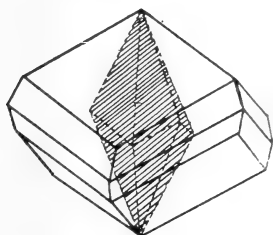


FIG. 1.

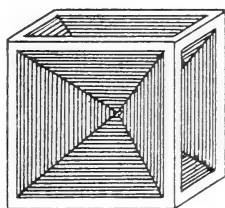


FIG. 2.

It frequently happens that a well-developed crystal can be seen within a larger crystal, both being of the same form and composition. Occasionally, we meet one form of crystal enveloping another

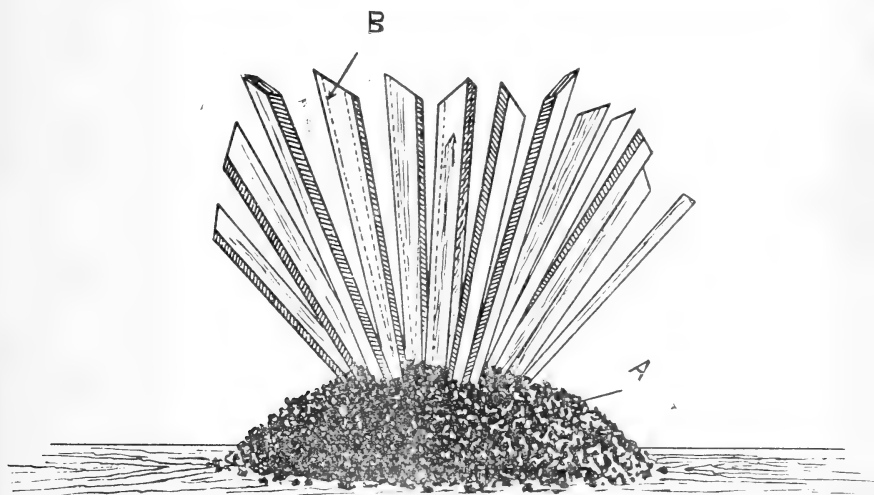


FIG. 3.

form. Prof. Williams, in his admirable work on crystallography, cites a crystal of calcite of rhombohedral habit, in the centre of which can plainly be seen a darker scalenohedron (*Fig. 1*).

The cavernous crystals (*Fig. 2*), or "hoppers," as they are sometimes called, present another singular form of crystallization. These

skeleton forms tend to develop when the crystals grow rapidly. Halite, galena and potassium iodide are commonly met with in this form. Mr. Foote, of this city, also showed me a shallow, cup-like crystal of vanadinite, which was, indeed, phenomenal. Irregularities of surfaces are often produced by corrosion subsequent to the formation of the crystals.

Hollow crystals of the following nature are occasionally met with: A crystal develops around a foreign substance of a less

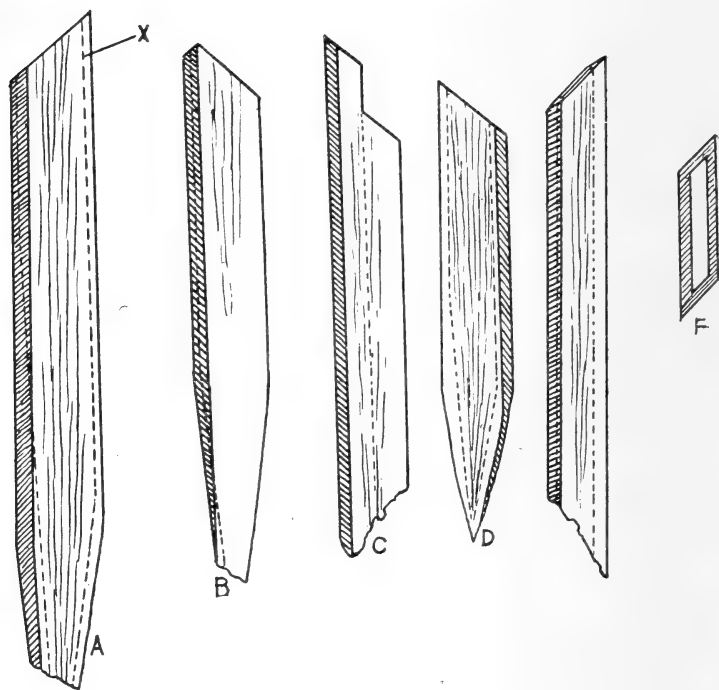


FIG. 4.

resisting nature. This foreign substance, in process of time, is removed by chemical or physical agents, leaving a hollow crystal. Quartz crystals of this nature have been found.

Thus, we have examples of one crystal developing around another, crystals whose faces are cavernous, irregularities caused by corrosion, and hollow crystals, formed as described above; but, to my knowledge, no geometrical, tubular crystals—crystals that have

developed around a void or their mother-liquor—have ever been seen, at least never reported.

In the course of some investigations, I obtained a growth of hollow crystals of monobromated camphor. I have often crystallized the above substance, but never before nor since have tubular crystals been formed. To me they were full of curiosity, having in all my crystallographic studies never seen or heard of hollow crystals. Prof. Pettee, in charge of mineralogy at the University of Michigan, to whom some crystals were sent, reported that the specimens sent him were without parallel for hollowness.

The tubular crystals were obtained as follows: A given quantity of crude monobromated camphor was dissolved in an equal weight of hot benzin, one-fourth a smuch animal charcoal added as there was monobromated camphor, boiled on the water-bath for about fifteen minutes, removed, vigorously rotated, so that the charcoal accumulated, cone-shaped, in the centre of the bottom of the flask, allowed to cool and crystallize over night. The crystals radiated in all directions from the cone-shaped charcoal (*Fig. 3*).

The tubular structure was observed by the mother-liquor retreating from the hollow of the crystals while drying them on filter-paper.

The prismatic crystals belong to the monoclinic system; vary in length from 2.5 to 4.2 centimeters; in width, from 3 to 4.6 millimeters, and in thickness, from 1.5 to 3.1 millimeters. The cross-sections of the crystals as well as the cross-sections of the orifices are rhombs. The free ends of the crystals are terminated by single planes, inclined about 45° . A few crystals are terminated by two planes, one large and one small plane, forming, nearly, a right angle with each other. The supporting ends of the crystals are somewhat constricted, on account of the crystal aggregate, tapering, in several instances, on the narrow sides, for several centimeters. This distortion of the crystal destroys the symmetry of hollow as well as that of the crystal.

Fig. 4 represents the various crystals in cross-section and side views.

305 CHERRY STREET,
PHILADELPHIA, PA.

NOTES ON THE RECENT LITERATURE OF BOTANY AND MATERIA MEDICA.

BY GEORGE M. BERINGER.

In accepting the commission of the editor to prepare for the AMERICAN JOURNAL OF PHARMACY reviews and abstracts from the current literature of botany and materia medica, the writer fully realizes the impossibility of at all presenting a large portion of the most valuable purely scientific labors of botanists, and must necessarily restrict the contributions to those most salient matters of more or less interest to pharmaceutical readers.

Botanical nomenclature continues to occupy a large share of the attention of systematic botanists, especially in America. Since the action of the Botanical Section of the A. A.

A. S., at the Rochester meeting in 1892, the discussion has been persistently maintained. At the Madison meeting in 1893, the botanists deemed it advisable to take even a more advanced stand, adopting the rule of priority in toto. The resolutions of the previous year were amended, and the clause of Section III, which had decided that the earliest specific name *is not to be retained* if it is identical with the generic name or with a specific name previously used in that genera, was repealed.

The repeal of this clause is to be regretted, as it has rendered possible the adoption of such barbarian scientific names as *Apios Apios*, *Hepatica Hepatica*, *Benzoin Benzoin*, *Barbarea Barbarea*, *Abutilon Abutilon*, *Linaria Linaria*, and *Catalpa Catalpa*.

The "List of Pteridophyta and Spermatophyta Growing Without Cultivation in Northeastern America," prepared by the committee appointed by these conventions, represents the views of the most progressive of the nomenclaturists, and has focussed the discussion which, in some directions, has become quite personal and acrimonious. It is significant that these radical ideas of nomenclature are being largely adopted by American botanical writers, and that in such a classical work as "Sargent's Silva of North America," these rules are being strictly followed.

The following list shows a few of the changes proposed in the names of some of the best known-plants. To pharmacists it is interesting to note the changes these views effect in the names of

drug-yielding plants, and especially those that are official, and will indicate some of the changes likely to appear in the next edition of our Pharmacopœia :

Common Name.	Official Drug Name.	Names as Given in Gray's Manual or the Present Pharmacopœia.	Proposed Names.
Couch-Grass	Triticum . . .	Agropyrum repens (L.), Beauv.	Agropyron ¹ repens (L.) Beauv.
Sassafras	Sassafras . . .	{ Sassafras variifolium (Sals.), O. Kuntze, (U. S. P.) } Sassafras officinale, Nees.	Sassafras Sassafras (L.) Karst.
Yellow-Pine		Pinus mitis, Michx.	Pinus echinata Mill.
Scrub-Pine		Pinus inops, Ait.	Pinus Virginiana Mill.
Fly-Poison		Amianthium muscetoxicum, Gray	Chrosperma muscetoxicum (Walt.) Kuntze.
False Solomon's Seal .		Smilacina racemosa, Desf.	Vagnera racemosa (L.) Morong.
Larger Yellow Lady's Slipper	Cypripedium .	Cypripedium pubescens, Swartz	Cypripedium hirsutum Mill.
Sweet Fern		Myrica asplenifolia, Endl.	Comptonia peregrina (L.) Coulter.
Alder		Alnus serrulata, Willd.	Alnus rugosa (Ehrh.) Koch.
Beech		Fagus ferruginea, Ait.	Fagus atropinicea (Marsh.) Sudw.
Spanish-Oak		Quercus falcata, Michx.	Quercus digitata (Marsh.) Sudw.
Live Oak		Quercus virens, Ait.	Quercus Virginiana Mill.
Slippery Elm	Ulmus	Ulmus fulva, Michx.	Ulmus pubescens Walt.
Osage Orange		Maclura aurantiaca, Nutt.	Toxylon pomiferum Raf.
Buckwheat		Fagopyrum esculentum, Moench.	Fagopyrum Fagopyrum (L.) Karst.
Sweet-scented Water Lily		Nymphæa odorata, Ait.	Castalia odorata (Dryand), Woodv. & Wood.
Spatter-Dock		Nuphar advena, R. Br.	Nymphæa advena Soland.
Magnolia	Magnolia (1880)	Magnolia glauca, L.	Magnolia Virginiana L.
Liverwort		Hepatica triloba, Chaix.	Hepatica Hepatica (L.) Karst.
Spice Bush		Lindera benzoin, Blume	Benzoin Benzoin (L.) Coulter.
Squirrel Corn		{ Dicentra Canadensis, D. C. } Corydalis Canadensis, Goldie	Bicuculla Canadensis (Goldie) Millsp.
White Mustard	Sinapis alba . .	Brassica alba (L.), Hook. fil. et Thomp.	Sinapis alba L.
Horse-radish		{ Nasturtium Armoracia, Fries. } Cochlearia Armoracia, L.	Roripa Armoracia (L.) Hitchcock.
American Ipecac . . .		Gillenla stipulacea, Nutt.	Porteranthus stipulatus (Muhl.) Britton.
Smoke Tree		Rhus Cotinoides, Nutt.	Cotinus Cotinoides (Nutt.) Britton.
Virginia Creeper . . .		Ampelopsis quinquefolia, Michx.	Parthenocissus quinquefolia (L.) Planch.
Evening Primrose . .		Oenothera biennis, L.	Onagra biennis (L.) Scop.
Fennel	Fœniculum . .	Fœniculum capillaceum, Gilibert	Fœniculum Fœniculum (L.) Karst.
Marsh Rosemary . .		Statice Limonium, L.	Limonium Carolinianum (Walt.) Britton.
Spearmint	Mentha Viridis	Mentha viridis, L.	Mentha spicata, L.
Dandelion	Taraxacum . .	Taraxacum officinale, Weber	Taraxacum Taraxacum (L.) Karsten.

¹ Simply a correction of spelling. Polygala senaga likewise replaces Polygala senega for the same reason.

**Deviation in
Development Due
to the Use
of Unripe Seed.**

Prof. J. C. Arthur, *The American Naturalist*, September, 1895, p. 804, regards *maturity* as applying to the seed as a whole and *viability* to the embryo, the physiological processes associated therewith being quite distinct. The author shows from personal experiments, as well as from recorded work of others, that considerable number of seed from unripe fruit will germinate so that viability precedes maturity. The writer holds that a seed is simply a young plant, enclosed in a protective covering, and accompanied by surplus nutriment. The resting condition of a seed is not essential to germination, but is purely incidental and designed to aid in distribution.

The seed and sometimes the associated parts of the fruit will continue to develop under circumstances which put a stop to all growth in the vegetative parts. This phenomenon is known as after-ripening. There are marked deviations from normal development in plants from immature seed. The seedlings are weaker, the rate of germination is generally slower and the plant is less able to withstand unfavorable conditions. In plants from green seeds there is an increase in the number of fruits, but they are smaller. This tendency is said to have been practically applied by Von Mons to the raising of apples, in order to check too vigorous growth and to increase fruitfulness. Plants from unripe seed have the advantage of ripening their fruit earlier. It was pointed out by Goodale, in 1885, and since by Goff, that some early market varieties of vegetables indicate that they have been originated through the use of green seed.

**Vegetal Dissemi-
nation in the
Genus *Opuntia*.**

J. W. Toumey, *Botanical Gazette*, August, p. 356, calls attention to the persistence with which these plants retain moisture. A thick epidermis, with small sunken stomata and evaporating surface reduced to a minimum by their condensed form, enables them to remain green for months, even when exposed to the dry and scorching heat from the southwestern plains. Half of one of the segments of *O. basilaris* placed in a small box, without either soil or moisture, produced a slender branch $5\frac{1}{4}$ inches long, having lost only 15 per cent. of its total weight in that time. This branch subsequently developed a second branch for about 2 inches in length before drying up. If these segments fall to the ground

even in the driest season of the year, the contained moisture is sufficient to enable them to put forth roots, a new plant resulting.

The function of the spines in the Cactaceæ has been generally asserted to be largely for protection; the writer claims that the cylindrical opuntias depend largely for dissemination upon the readiness with which the branches break off and upon the highly developed barbed spines. The flat opuntias are nearly all smooth, but here the usual habit is prostrate or semi-prostrate, so that the branches bending or creeping take root at the joints. The young branches of the plato-puntia are likewise more easily detached. This appears to be the prevailing method of dissemination, so much so that several species have almost lost the power of seed production, and even in species not sterile, owing to the unfavorable climate, the seed seldom germinate.

**Development of
Vegetable
Physiology.**

This vice-presidential address of Professor J. C. Arthur, before Section G, of the A. A. A. S., at the Springfield meeting in August, is published in the *Botanical Gazette*, September, p. 381, and will repay careful perusal. Physiology deals with what plants do, their methods of activity, their behavior; while the other divisions of botany treat of what plants are or have been, their form, structure and relation of parts.

Only the vaguest notions are current regarding the nutrition of plants, the uses of the leaves, the movements of sap, the purposes of color, and the means by which new positions are assumed. This ignorance is primarily due to the fact that almost nothing can be learned of the functions of plants from direct observation.

Vegetable physiology, as the term is generally employed, is not a homogeneous science. The most obvious distinction to be made in the physiological aspect of organisms is in regard to their maturity. In the embryonic or juvenile condition, it manifests peculiarities of the highest import, quite unlike those of the adult. The physiology of reproduction belongs here, and includes not only a study of the formation and increase of the young plants, that is, embryology, but genesiology as well, that is, the philosophy of the transmission of qualities and powers from the parent to the offspring. Vines has recently called attention to the fact that even vegetative reproduction, as in the case of the growth of a plant from a cutting, brings about rejuvenescence of the protoplasm, the new individual showing the characters of youth and not of maturity.

The author adopts the term "Caliology" for the physiological study of the cell, including both its reproductive and vegetative aspects. The activities of the plant may be considered from two standpoints: that of the plant's individual economy and of the plant's social economy, or its relation to other plants and animals and the world at large. The inappropriateness of the terms biology and phytobiology, to the study of the latter division, is referred to. Ecology is the term which has been proposed almost simultaneously in America and in England, for the study of the external or sociological economy of the adult plant. The approved tendency is to restrict the usage of the term "vegetable physiology" to the consideration of the internal or individual economy dealing with the most vital problem of how the individual lives.

**Nature and Life
History of
Starch Grains.**

In the *Botanical Gazette*, October, p. 458, D. T. MacDougal reviews the work of Arthur Meyer,² which modifies materially the accepted views on these subjects. According to this investigator, starch grains are true sphere crystals, in every way analogous to the sphere crystals of inulin, and are composed of two forms of amylose and a trace of amyloextrin. In an anomalous form, which colors reddish-brown with iodine, the proportion of amyloextrin is very large. This red starch is characteristic of a large number of saprophytes, but has been found in less than a score of the higher green plants. Meyer finds that the action of diastase on starch is a purely katalytic process, and in every way analogous to the katalytic action of acids, except that it is more easily influenced by external conditions, such as heat, etc.

The validity of the observations upon which is based Nageli's hypothesis as to the growth and structure of starch grains, is denied in toto. The grains have their origin and growth entirely within chromatophores, where they are held as long as the cell is living. Growth consists of the superposition of new layers of materials on those previously formed. The layers are due to the periodic activity of the chromatophore. The contour is due entirely to the pressure exerted on the chromatophore by the cytoplasm, and the size depends upon the biologic relations of the plant. Thus, in

²Arthur Meyer, Untersuchungen über die Stärkekörner der höheren Pflanzen. Gustave Fischer, Jena, 1895.

rapidly germinating seeds, or in other structures where rapid solution of reserve material is desired, the grains are small, and easily fissured.

Mr. R. A. Rolfe has monographed the genus
Vanillas of Commerce. Vanilla, and the *Kew Bulletin* for August, p. 169, abstracts the historical and descriptive account of the species yielding the commercial fruits.

Four species appear to yield all the vanillas of commerce, and two other species are indicated as worthy of experimentation in this connection.

Vanilla planifolia,³ Andr., Bot. Rep., viii (1808), t. 538.—A tall climber, with very long, somewhat flexuose, succulent, green stems, and slender, flexuose or twining, white, aerial roots, opposite to the leaves. Leaves subsessile, oblong, acute or shortly acuminate, succulent, bright green, 4 to 9 inches long, 1½ to 2½ inches broad. Racemes axillary, 2 to 3 inches long. Bracts numerous, spirally arranged, oblong, sub-acute or obtuse, concave or conduplicate, 2 to 6 lines long, gradually diminishing upwards. Pedicels, 1½ to 2 inches long; green. Sepals and petals linear, oblong and obtuse; 2 lines long; light, glaucous green. Lip trumpet-shaped, a little shorter than the sepals and petals, of the same color, united to the sides of the column to near its apex, and then convolute around it; apex three-lobed, mid-lobe longer and retuse, margin revolute and denticulate, nerves carinate, and those in front densely crenulate, verruculose, buff yellow; disc with a tuft of retrorse hairs about the middle. Column clavate; 1⅛ to 1¼ inches long; hairy on the face. Capsule elongated linear, obscurely trigonous; 6 to 9 inches long; 6 to 7 lines broad.

³ As Salisbury's name, *Myobroma fragrans*, antedates that of Andrews, it is apparent that, if the law of priority be here applied, the correct binomial would be *Vanilla fragrans* (Salisb.). There were at least four binomials applied by earlier authors; but as several species were in each case confounded under the same name, it is difficult to decide positively which of these yet older names should be retained for this species. If, however, we accept the determinations of Rolfe, that these names in part referred to this species, and adhere to the priority rule, the synonymy would appear to be:

Vanilla Vanilla (L.), 1753.

Vanilla Mexicana (Mill.), 1761.

Vanilla aromatica (Su.), 1799.

Vanilla fragrans (Salisb.), 1807.

Vanilla planifolia (Andr.), 1808.

Habitat, southeastern Mexico, in the Vera Cruz district, Misantla and Yucatan, also in British Honduras, Guatemala and Costa Rica. Cultivated in the Mascarene Islands, Java, the West Indies, and other parts of the tropics.

This species produces the true Mexican vanilla of commerce, which has been known ever since the discovery of America by the Spaniards, and which was described by Clusius as long ago as 1605, under the name of *Lobus Oblongus Aromaticus*. Its early history is much confused, as, for a long time, three or four species were confounded together, and, even when the present one was described, it was not known as the source of the vanilla of commerce, which was then, and for a long time afterwards, thought to be the *V. aromatica*, Sw. (*i. e.*, *V. inodora* Schiede). It was introduced to cultivation about 1739, but was probably soon afterwards lost. The Marquis of Blanford reintroduced it about the beginning of the present century, and it flowered in the collection of the Right Hon. Charles Greville, at Paddington, in 1807, whence it can be directly traced to various continental gardens, to Java, where Blume re-described it under the name of *V. viridiflora*, and to Réunion, thus originating the present industry in that island. Salisbury's *Myobroma fragrans* (1807)³ was drawn from the same individual as the original *V. planifolia*, Andrews. *V. sativa* and *V. sylvestris*, of Schiede, are chiefly known by the original descriptions, but are evidently forms of the same species, differing only in the length of the fruit; the former being a cultivated race, and the latter a wild original.

Vanilla pheantha Rehb. f.—General habit of the preceding. Bracts fewer and larger, broadly elliptical-oblong, sub-obtuse; 3 to 7 lines long, 2 to 4 lines broad. Flowers larger; pedicels green. Sepals and petals, $2\frac{1}{4}$ to $2\frac{3}{4}$ inches long; greenish-yellow. Lip greenish-yellow, whitish in the throat, apex obscurely three-lobed and nearly truncate, nerves not carinate in front, disc with a pair of hairy lines extending from the central tuft of hairs towards the base, Capsule linear-oblong, obscurely compressed; 3 inches long, $\frac{1}{2}$ inch broad.

Habitat, West Indies, Cuba, St. Vincent, Trinidad. This is an indigenous species which has been confused with *V. planifolia*, Andr., though it is easily distinguished by its much larger flowers, lip without verrucose disc, and its much shorter fruit. It is cultivated

in the Botanic Gardens of Jamaica and Trinidad, but there is no evidence of its fruit being of any commercial value.

Vanilla Pompona Schiede.—General habit of *V. planifolia* Andr, but leaves large, 6 to 11 inches long, $1\frac{1}{2}$ to $4\frac{1}{2}$ inches broad. Bracts larger and rather more fleshy; pedicels yellow-green; sepals and petals 3 to $3\frac{1}{2}$ inches long, greenish yellow. Lip bright yellow, nerves somewhat thickened, central tuft consisting of descending imbricated scales rather than hairs. Capsule linear-oblong, strongly trigonous, 6 to 7 inches long, 1 to $1\frac{1}{4}$ inches broad. Habitat, south-eastern Mexico, Papantla and Colipa, valley of the Cordova, Nicaragua, Panama, Columbia, Tolima, Venezuela, Trinidad, British Guiana, Surinam, Cayenne. Cultivated in Martinique, Guadeloupe and possibly other localities. This species is much more widely diffused than *V. planifolia*, and its fruit has long been known as an article of commerce, being now usually sold under the name of West Indian Vanillons. It is the "Grosse Vanille" of Aublet, the "Baynilla de acguiles" of Humboldt, and the "Baynilla Pompona" of Schiede. The pods are more difficult to dry, and they fetch a much lower price in the market.

Vanilla Gardneri Rolfe.—Stems fleshy thick; leaves sessile, oblong, obtuse, fleshy; raceme short, thick; bracts ovate obtuse, rigid, prominent; sepals petal-like, linear, lanceolate sub-obtuse; lip oblong sub-entire, faintly submembranaceous, nerves scarcely thickened; disc subpubescent crested, column clavate, capsule unknown. Habitat, Brazil, in dry, rocky places, Paranagua, Natividade, Pernambuco, Para. A species allied to *V. Pompona*, Schiede, but with leaves about half the size, longer racemes, with smaller not reflexed bracts, and rather smaller, more membranous flowers. Gardner confounded it with *V. planifolia* Andr., and remarked: "This is the plant which yields the vanilla in Brazil, though, unfortunately, his specimens are without fruit. There are pods in the Kew museum labelled 'Brazilian or Bahia Vanilla,' which are $5\frac{1}{2}$ inches long by fully 1 inch broad, fleshy and distinctly triquetrous, and thus approaching those of *V. Pompona*, but with a rank odor. These are probably produced by the present species. *V. appendiculata*, Rolfe, is indigenous to British Guiana. The fruit is aromatic, but it is uncertain if it has any economic value."

V. odorata, Presl, of Ecuador, Guayaquil, is only known from description. Presl remarks that, although fruits had been collected thirty-six years, they still retained their aromatic fragrance.

J. S. Ward, in the *Pharmaceutical Journal*, September 7, 1895, describes a false chiretta, which had been offered in the English market by a broker. The loose bundles resembled a

A False Chiretta. parcel of dried broom tops. Each plant was complete, root and stem being perfect; the branches slightly broken, the leaves mostly absent. Intermixed were some extremely slender stems, panicles of pedicellate flowers, corolla and calyx, and glandular hairs; a few leaves only could be found, which were slender and much broken. The stems are from $\frac{1}{8}$ to $\frac{1}{4}$ inch in thickness, near the base woody, quadrangular, furrowed, smooth, slightly knotty at the points from which the branches spring. The longitudinal furrows are continued through the roots, which have numerous fine radicles. The leaves are opposite, decussate; branches erect or forming an acute angle with the stem, terminal shoots extremely slender. The whole is a little more than 2 feet in length. The origin proved to be *Andrographis paniculata*, Nees. This plant belongs to the order Acanthaceæ, and is described by Hooker as indigenous to a large portion of India. It is known there as Indian Chiretta.

An interesting Ustilago on *Zizania latifolia* is described by P. Hennings, in *Hedwigia*. It is sold in the markets of Tonkin as a vegetable. Japanese women are said to color the eyebrows and hair with the spores mixed with oil. These are likewise mixed with lac to produce rusty-colored wares.—*Botanical Gazette*.

The Sakais living in the plains employ the *Antiaris* poison; the Sakais of the hills use a poison prepared from three hill plants called *Ipoh Aker*, *Pruul* and *Lampong*. Dr.

Ipoh Poison. Stapf has determined that the *Ipoh Aker* is probably from a new species of *Strychnos*, closely allied to *S. maingayi*. *Pruul* is from a Rubiaceæ, the *Coptosapelta flavescens*, Karth. An examination of the root bark, by Dr. Ralph Stockman, indicates that in future it must be classified among the poisonous plants.—*Kew Bulletin*, June and July, 1895.

THE CHEMISTRY OF RHUBARB. —

BY DR. J. OSWALD HESSE.

Reprinted from the *Pharmaceutical Journal*, October 19, 1895.

According to the investigations of Schlossberger and Döpping,¹ rhubarb contains, in addition to three resins—aporetin, phaeoretin and erythreoretin—as an essential constituent, chrysophanic acid, which was, on the basis of its properties and analysis, declared by them to be identical with the chrysophanic acid which had previously been obtained by Rochleder and Heldt from the yellow lichen, *Physcia parietina*.² This chrysophanic acid of rhubarb was subsequently observed by Warren de la Rue and Hugo Müller, in a sediment from rhubarb tincture which had been kept for a long time, and they showed how this substance could be prepared from rhubarb by means of benzene.³ They adopted the name of chrysophan, as the substance has not the character of an acid, but their proposal has not been generally followed. These observers also obtained another constituent of rhubarb, viz: emodin; to which they gave the formula $C_{40}H_{30}O_{13}$, representing chrysophan or chrysophanic acid by the formula $C_{10}H_8O_3$, which had been adopted by Rochleder and Heldt for the chrysophanic acid of *Physcia*.

Meanwhile, Gerhardt had suggested that the formula of chrysophanic acid should be $C_{14}H_{10}O_4$, and that it was in some way related to alizarin. At the instigation of Rochleder, the chrysophanic acid of rhubarb was then further investigated by Pilz,⁴ who confirmed the results obtained by Schlossberger and Döpping, and concluded that the formula suggested by Gerhardt was incorrect. In a subsequent investigation, however, Rochleder⁵ obtained results perfectly in accordance with Gerhardt's formula, and he explained this difference as being due to the circumstance that the substance cannot be dried at 100° C., but is rendered anhydrous only when heated to 115° C. in a current of carbonic anhydride. Still later, this formula was found to be incorrect, when Liebermann and O. Fischer⁶ showed that the sublimed substance has the formula

¹*Annalen der Chem. Pharm.*, 50, 213.

²*Ibid.*, 48, 12.

³*Chem. Soc. Quart. Journ.*, 10, 300.

⁴*Chem. Centralbl.*, 1862, p. 6.

⁵*Berichte*, 2, 374.

⁶*Ibid.*, 8, 1102.

$C_{15}H_{10}O_4$, and that it is closely related to emodin, for which the formula $C_{15}H_{10}O_5$ was deduced by Liebermann⁷ from his own analyses, as well as from those of De la Rue and Müller.

According to Kubly,⁸ chrysophanic acid exists only in very small amount in fresh rhubarb, but is produced by the alteration of a glucoside, to which he gave the name of chrysophan. Proctor⁹ has also observed a formation of chrysophanic acid in rhubarb under the influence of exposure to air in contact with water and caustic alkali.

Schroff¹⁰ considers that chrysophanic acid is the active principle of rhubarb. However, the substance with which Schroff operated was not the chrysophanic acid of rhubarb, but that of *Physcia*, and, moreover, it was not pure. On the other hand, v. Auer¹¹ experimented with the chrysophanic acid of rhubarb, and found that it had no action upon the intestinal canal. According to his results, the purgative constituent of rhubarb is still unknown.

In prefacing the account of my investigation with these remarks, I must also state that it was undertaken in consequence of the observation¹² that the composition of chrysophanic acid obtained from *Physcia parietina* is not represented by the formula $C_{15}H_{10}O_4$, which has been found by Liebermann and Fischer to represent the sublimed chrysophanic acid of rhubarb. Rochleder's statement that the chrysophanic acid of rhubarb loses some water at $115^{\circ} C.$, suggested the possibility that at the temperature of sublimation there might be a further elimination of water, and that the sublimed substance might be a product of condensation. It appears, however, from my investigation of the subject, that neither the statements of Rochleder and Heldt relating to the composition of chrysophanic acid from *Physcia*, nor those of Schlossberger and Döpping, De la Rue and Müller, or Pilz and Rochleder, in reference to the chrysophanic acid of rhubarb, are correct, but I have been able to confirm the results of Liebermann and Fischer. Moreover, the chrysophanic acid of *Physcia* is not identical with that of rhubarb, and the opinion expressed by Schlossberger and Döpping that these

⁷*Berichte.*, 8, 970.

⁸*Neues Rep. für Pharm.*, 17, 216.

⁹*Pharm. Journ.* [3], 25, 233.

¹⁰*Vierteljahresch. für Pharm.*, 5, 269.

¹¹*De Rad. Rhei.* Dorpat, 1859.

¹²*Lietig's Annalen*, 284, 177.

substances were identical, may be ascribed to impurity of the material in their hands.

In a previous paper I have described the chrysophanic acid of *Physcia* under the name of physcion, and as having a composition represented by the formula—



The composition of the chrysophanic acid of rhubarb is represented by the formula—



and I propose retaining for it the name chrysophanic acid, although the term is incorrect, because this substance does not possess the characters of an acid, as has been already pointed out by De la Rue and Müller.

The material operated upon in this investigation was Chinese rhubarb; one pound in a state of fine powder was digested with five times its weight of ether in a glass flask, and frequently shaken during ten days. The ether solution was then poured off, filtered and distilled, the distillate being returned to the partially exhausted rhubarb. By repeating this treatment several times until, in the course of three months, ten successive portions of extract had been obtained, the rhubarb powder was still only imperfectly extracted; it had a grayish yellow color and became red upon the addition of caustic potash solution, probably owing to the presence of some rhein.

The somewhat considerable quantities of ether extract obtained as residues assumed a crystalline condition on cooling. When treated with cold 80 per cent. alcohol a dark brown solution was formed, and a pulverulent crystalline substance remained undissolved. On spontaneous evaporation the solution left an amorphous residue containing paler colored crystalline particles consisting of crystals of a colorless substance and a residue of chrysophanic acid. These crystals could be separated by further treatment of the residue with weak alcohol, and in that way a solution was obtained which left, on evaporation, a perfectly amorphous dark brown residue, possessing in a high degree the purgative property of rhubarb. The alcoholic solution of this substance has a bitter and somewhat acrid taste, when boiled with hydrochloric acid it did not yield either chrysophanic acid or sugar. This extract contained almost

the whole of the active constituent of the drug, and consequently that does not appear to be of the nature of a glucoside. The resinous character of this substance, however, deterred me from undertaking any further investigation of it, and I proceeded to examine the above-mentioned crystalline powder, which consisted essentially of chrysophanic acid, emodin, and a new substance, rheïn.

I. CHRYSOPHANIC ACID.

The crystalline residue separated from the extract was repeatedly treated with a dilute solution of potassium carbonate at a temperature of about 40° C., in a vessel from which air was excluded, until a solution was eventually obtained which did not become sensibly red-colored within twenty-four hours. The undissolved portion of the powder was then dissolved in alcohol or glacial acetic acid and recrystallized until the melting point of the crystals was 178° C.

Pure chrysophanic acid does not dissolve at the normal temperature in a water solution of potassium or sodium carbonate. On boiling, a little is dissolved, forming a red solution, from which the greater part of the chrysophanic acid is again deposited on cooling. But the solution still remains colored red, probably indicating that some part of the chrysophanic acid has, under the influence of exposure to the air, been converted into emodin, the substance most nearly related to it, with which it is associated in rhubarb. Chrysophanic acid is quite insoluble in a water solution of potassium or sodium bicarbonate. When crystallized from alcohol or glacial acetic acid it forms golden-yellow laminæ, resembling moss in their arrangement; these crystals melt at 178° C.; they are not hygroscopic, neither do they lose water when heated to 115° C., or at higher temperatures. The composition of chrysophanic acid is represented by the formula $C_{15}H_{10}O_4$.

	Calculated.	Found.
Carbon	70.86	70.81
Hydrogen	3.93	3.87

When chrysophanic acid is treated with hydriodic acid (1.7 sp. gr.) no alkyl iodide is formed, but the substance is converted by reduction into chrysophan-hydro-anthron, $C_{15}H_{12}O_3$, which dissolves in the alkaline liquid with a wine-red color, but apparently is not again converted into chrysophanic acid on shaking the solution with air. In this particular there is a difference between this sub-

stance and the chrysophan-hydro-anthron prepared in a different way by Liebermann;¹³ but I am disposed to think that the difference is due to some accidental circumstance.

2. EMODIN.

This substance is dissolved, together with rheïn, by the solution of potassium carbonate, with which the pulverulent residue is treated in separating chrysophanic acid. The solution acidified with hydrochloric acid was shaken with ether, and, on evaporating the ether, a residue was left consisting essentially of emodin and rheïn. By treatment with boiling toluene, emodin is extracted from the residue, and most of it is deposited again as the solution cools; on evaporating the toluene, a further small portion of emodin is obtainable, which may be conveniently put aside for further treatment with toluene. The crystals first deposited were then dissolved in hot glacial acetic acid, and the solution mixed with boiling water until crystallization commenced, the emodin then separated in well-defined, orange-colored prisms containing one molecule of water, which is given off at 120° C., the crystals then becoming dull.

	Calculated for $C_{15}H_{10}O_5 + H_2O$.	Found.
H ₂ O	6.25	6.30
	Calculated for $C_{15}H_{10}O_5$.	Found.
Carbon	66.67	66.35
Hydrogen	3.70	3.93

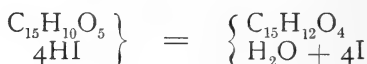
Anhydrous emodin melts about 250° C. It dissolves readily in a cold water solution of potassium or sodium carbonate with purple-red color; very readily in caustic potash or soda. It also dissolves readily in ammonia solution, and, on addition of lead acetate, a flocculent, amorphous, purple-colored precipitate is formed. Emodin is freely soluble in alcohol, especially with the aid of heat, and the solution has an acid reaction. When treated with hydriodic acid (1.7 sp. gr.) in Zeisel's apparatus, there is not any formation of methyl iodide, as might be expected; but, on the contrary, emodin is reduced in the same manner as chrysophanic acid, chrysophan-oxyhydro-anthron, $C_{15}H_{12}O_4$, being produced. On recrystallizing this product from hot glacial acetic acid, it forms pale yellow shin-

¹³ *Berichte*, 21, 436.

ing laminae, which melt between 230° and 240° C., and become dark-colored.

	Calculated for $C_{15}H_{12}O_4$.	Fcund.
Carbon	70.36	69.59
Hydrogen	4.68	4.94

The formation of this product from emodin is represented by the equation :



3. RHEIN.

In treating the mixture of emodin and rhein with hot toluene, the rhein remains undissolved, and may then be purified by recrystallization from hot glacial acetic acid. It forms microscopic yellowish-brown scales, is only sparingly soluble in hot or cold alcohol, almost insoluble in toluene, benzene, ether or cold glacial acetic acid, and is but slightly soluble in the boiling acid. When heated to 280° C. it does not undergo any alteration; considerably above that temperature it melts and is decomposed, forming a black liquid. Rhein is quite insoluble in water; its alcoholic solution is distinctly acid. At the normal temperature it dissolves readily in caustic potash or soda, also in solution of potassium or sodium carbonate, with a deep purple-red color. When a solution of rhein in potassium carbonate is mixed with solid potassium carbonate a compound of rhein with potassium is separated as an amorphous purple mass. Rhein also dissolves in a solution of potassium or sodium bicarbonate, but not so rapidly as in a solution of neutral carbonate. It dissolves also with purple color in ammonia, and the solution forms flocculent amorphous precipitates of a purple color on addition of lead acetate, argentic nitrate, or barium chloride.

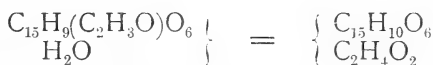
When a solution of rhein in caustic alkali or in other basic solvents is mixed with hydrochloric acid the rhein is separated in a colloid condition, and from very concentrated solution it presents the appearance of a translucent, slimy mass. When these solutions are boiled with excess of hydrochloric acid the rhein soon assumes the sparingly soluble crystalline condition above described. In the colloid condition rhein is much more soluble in ether than the crystalline substance. It has a sweetish acid taste, and does not appear

to possess any purgative property. The composition of rhein is represented by the formula $C_{15}H_{10}O_6$.

	Calculated.	Found.
Carbon	62.93	62.95
Hydrogen	3.49	3.54

By treatment with hydriodic acid (1.7 sp. gr.), rhein does not yield any alkyl iodide, but it appears to undergo alteration in the same manner as chrysophanic acid and emodin. The immediate product thus obtained was very probably chrysophan-dioxy-hydro-anthron; it was a pale yellow crystalline product, but I was unable to obtain it in a condition fit for analysis by recrystallization from glacial acetic acid, as the solution gradually became dark-colored, and deposited an unpromising semi-crystalline powder.

When rhein is heated to 85° C. with a large excess of acetic anhydride for several days, it is gradually converted into a pale yellow crystalline powder consisting of minute scales, which melt between 262° and 265° C., after previously softening. This derivative of rhein is very sparingly soluble in hot glacial acetic acid or in hot alcohol, but it dissolves readily in water solutions of potassium carbonate or caustic potash. These solutions have an intense purple color. When the potash solution is heated for some time, the product of acetylation is reconverted into rhein and acetic acid according to the equation—



A determination of the acetic acid so produced gave the following results:

	Found.	Calculated.
Acetic acid	14.1 p. c.	13.1 p. c.

Analysis of the acetylated substance gave:

	Found.	Calculated for $C_{15}H_8(C_2H_3O)_2O_6$.
Carbon	61.88	62.19
Hydrogen	3.94	3.65

When this product or rhein is heated to 190° C. for five hours with acetic anhydride in a sealed tube, further acetylation takes place, and diacetyl rhein, $C_{15}H_8(C_2H_3O)_2O_6$, is produced. This compound was obtained in the form of small greenish-yellow needles; it dissolved more readily in glacial acetic acid or in acetic anhydride

than the mono-acetyl derivative, especially on heating, and was to some extent soluble in dilute acetic acid. It was readily soluble, also, in potassium carbonate solution, caustic potash, or ammonia, and with purple color. On heating in potash solution, rheïn and acetic acid are reproduced according to the equation—



Diacetyl-rheïn melts at 236° C. Analysis gave the following results :

	Calculated for $\text{C}_{15}\text{H}_8(\text{C}_2\text{H}_3\text{O})_2\text{O}_6$.	Found.
Carbon	61.62	61.75
Hydrogen	3.78	3.60

It may be assumed that by longer continued heating, or by some other modification of the treatment, rheïn would take up two more acetyl groups with formation of tetracetyl rheïn.¹⁴ Taking that assumption as well founded it would appear that rhubarb contains a series of substances the relations of which to each other may be represented by the following formulæ:

Chrysophanic acid	$\text{C}_{15}\text{H}_8\text{O}_2 \cdot (\text{OH})_5$.
Emodin	$\text{C}_{15}\text{H}_7\text{O}_2 \cdot (\text{OH})_3$.
Rheïn	$\text{C}_{15}\text{H}_6\text{O}_2 \cdot (\text{OH})_2$.

It may probably also be inferred that these substances originate from a still unknown constituent of rhubarb by oxidation, and, in fact, Proctor considers there is reason for believing that after extracting rhubarb by means of benzene, chrysophanic acid is again formed on exposing the exhausted residue to the action of the air. The entire process of change would then be



It must be noted, however, that Proctor does not say that he has actually obtained chrysophanic acid in the way suggested. As for Kubly's opinion in respect to the origin of chrysophanic acid, I consider that it is open to considerable doubt, and that his chrysophan was probably nothing else than impure rheïn.

It is well known that rhubarb frequently presents a streaked appearance, and it is stated that at one time red rhubarb was brought

¹⁴ Owing to want of material, I have been unable to try this experiment.

into the market from China. I am of opinion that the red coloration in such instances may be due to emodin, and if that be the case an explanation might be found of the circumstance that Grothe¹⁵ appears to have obtained only emodin in his examination of rhubarb, though he incorrectly took that substance to be chrysophanic acid. This substance does not crystallize in prisms, neither do the crystals contain a molecule of water as stated in regard to the substance described by Grothe.

It still remains to be ascertained whether the roots of different kinds of rheum are alike in containing the same constituents that I have obtained from Chinese rhubarb and described in this paper; also, whether there may be further distinctions between them and the constituents of roots of varieties of *Rumex*. In that respect v. Thann¹⁶ was of opinion that he had proved the identity of rumicin and chrysophanic acid; but Rochleder subsequently raised a question as to the purity of the substances referred to. Moreover, at that time, pure chrysophanic acid was unknown, and it will now be desirable to renew the investigation of those varieties of *Rumex* in which it is said that chrysophanic acid has been found. In this connection I must not omit to mention that for some months past I have been engaged upon the investigation of the roots of *Rumex nepalensis*,¹⁷ a native of India, and that I have found they contain several substances, giving the characteristic reaction with caustic potash in common with the above-mentioned constituents of rhubarb, though they are certainly, like physcion, quite different substances. I intend in a future communication to deal with these substances more fully.

Queensland cherry, the fruit of an Euphorbiaceous plant (*Antidesma dallachyanum*, Baill.), is also known as the Herbert River cherry. The plant yielding it is a shrub or small tree, closely allied to *A. Ghæsembilla*, Gærtn., of the Eastern Archipelago and Ceylon. According to Bailey, "the fruit, which, in size, equals that of large cherries, is of a sharp acid flavor, resembling that of the red currant, which it also equals when made into jelly. As the European fruit is placed among medicinal plants, on account of its juice being grateful to the parched palates of persons suffering from fever, this is worthy of a similar place."—*Kew Bulletin*.

¹⁵ Wiggers' "Pharmakognosie," 1864, p. 242, and *Chem. Centralbl.*, 1862, p. 107.

¹⁶ *Annalen Chem. Pharm.*, 107, 324.

¹⁷ For a supply of this material I am indebted to the kindness of Mr. D. Hooper, of Ootacamund.

A FEW REMARKS CONCERNING THE CASTOR-OIL
BEAN.—*RICINUS COMMUNIS*, LINN.

BY D. F. DAVENPORT.

Read before the Meeting of the Georgia Pharmaceutical Association,
Savannah, 1895.

Gentlemen of the Georgia Pharmaceutical Association:—You have made a request of me to write a treatise on a subject which very few of us this far South and East know much about. The experiments which have been made in my locality have been made at my expense, and the “returns,” on account of the cold, and of imperfect knowledge of their culture, has resulted rather disastrously. Still there are many reasons to believe that South Georgia, and especially Sumter County, is admirably adapted to this “bean.”

The experiments began by loaning out seed to the farmers in various localities in small lots, and giving a guarantee of a price per bushel delivered in any quantity at Americus, after September 1, 1894. Only one farmer made a return of the seed, and one other was so delighted with the enterprise that he made his own shipments to the Northern market, and this year he has a considerable acreage in their culture. With the others the continued frosts killed the young plants, and very few came to maturity.

Sufficient to say, however, the plant assumes an enormous size, and yields abundantly in this soil and climate. As to the character of the seed: one large crusher said that the specimen sent from Sumter County was the finest he ever saw, and that if we could grow beans like the sample sent he would give a contract for several thousand bushels.

Just at this time, however, the “Wilson Bill” took 50 cents duty off of castor beans per bushel, and the West Indies up to date has “out-classed” our section.

From meagre observations, however, I am sure that, if sufficiently understood and extensively cultivated, we have the advantage of that now rebellious district, even as it is.

One thing we must understand thoroughly, and that is their *cultivation*. All depends upon the knowledge of it. A few facts are given, gathered from the St. Louis market, which will be of great benefit to those who expect to engage in the enterprise in this locality.

Almost any soil that will produce wheat or corn will answer for the castor bean. When it can be had, a sandy loam is preferable. The soil should be dry. Wet, heavy soils are not adapted to its successful culture.

One important fact in connection with the culture of castor beans is that it is one of the most fertilizing crops raised. In this respect it surpasses even clover. Many farmers say, for fertilizing purposes, a crop raised upon poor land is worth several dollars per acre to the land, on account of the additional fertility gained by it.

PREPARATION OF THE SOIL.

The ground should be put in good condition for the seed, as for other crops. One thorough plowing, and three or four harrowings, with a heavy harrow, will be a sufficient preparation.

PLANTING THE SEED.

The ground is now laid off in rows, 5 or 6 feet apart, each way, except that between every sixth and seventh row, a distance of about 8 feet between the rows is left one way, to admit a horse and wagon or slide to pass, to take the beans when gathered. Hot water, somewhat below the boiling point, should be poured over the seeds, and they should remain in this water twenty-four hours before being planted. The temperature of the water will, of course, be gradually reduced to the temperature of the atmosphere. Applying the hot water once will be sufficient. If planted without this preparation, they are a great while in germinating, many of them not making their appearance for three or four weeks. With this preparation they will soon germinate and come up regularly. Some farmers put in each hill one-half of those which have hot water poured over them, and one-half those which have not; so that if the cut-worms destroy the first that come up, a stand may be obtained from the others, which will come up a week or two later. Good, sound, plump seed should be selected for planting. A bushel will plant fifteen to twenty acres. Eight or ten seed should be dropped in each hill. But one, or, at most, two plants are to be left in a hill. As the cut-worm is quite destructive to the plants, this number of seeds is recommended, so as to be certain of an even stand. Of course, replanting can be done; but it is better to avoid it, if possible, by planting plenty of seed. The seed should be planted as soon as all danger of frost is over. The plants are as

easily destroyed by frost as our common bean, and, therefore, planting should be delayed till after the 1st of April.

AFTER-CULTURE.

The cultivation of the plants consists in destroying the weeds and grass, and keeping the soil open and mellow. These objects are chiefly attained by using the horse and cultivator, or small plow, working between the rows both ways. It is also necessary to work among the plants with hoes, going over them two or three times, cutting the weeds away from the plants that cannot be reached with the plow or cultivator, and drawing a little mellow earth to the plants, gradually reducing the number to one plant in the hill, though two are occasionally left. One strong, vigorous plant, however, will produce better seed than two in the same hill, and as great a quantity of beans. After the plant is 2 feet high it is capable of taking care of itself, and grows rapidly. After heavy rains, however, it is still advisable to work between the rows with the horse cultivator, breaking up the crust that has formed on the surface of the ground, and opening and loosening the soil to derive a greater benefit from the atmosphere. It will be seen that the cultivation is as simple as that of corn or of the common bean.

HARVESTING THE CROP.

About the first day of July the beans begin to ripen. They are produced in pods or husks, on spikes of various lengths, and should be gathered as soon as the pods begin to turn brown, to prevent loss by their popping out on the field, as beans, when ripe, pop or burst from the pod quite a distance. They are gathered by cutting off the entire spike. Each plant has a number of these, and they are produced and ripen in succession till frost. Of course, only those exhibiting brown pods should be cut. These spikes are then thrown into a wagon or on a slide, passing through the broad rows, and hauled away to the

DRY YARD,

which is made on a piece of land near the bean fields, sloping to the south, so as to get as much heat as possible from the sun to ripen the beans and cause them to burst from the husks. Cut off the sod, then roll the ground down hard, and make a fence around the yard by placing boards up against rails laid on crotched sticks or posts; though the fence is not necessary if the yard is made large

enough to leave a space outside the beans of 12 or 15 feet, as many of the beans will pop that distance, and if the fence is not built, or the space left, many of the beans will be lost in the grass or field beyond the yard.

The spikes are occasionally turned over and exposed to the sun, until all the seeds have left the husks, when the old spikes are taken away and a new supply added. The same process is gone through with the entire crop. Great care should be taken to prevent the beans getting wet. Dirty beans command much less price, and sprouted beans are nearly worthless. When rain is anticipated, rake the spikes into a heap and cover them with straw, plank or tarpaulins; sweep the beans up, clean them with a fanning mill, and store in a dry place. Do not attempt to pop them out in pops over the fire, as it renders them almost worthless.

BOARD FLOORS.

It will undoubtedly pay most farmers to make board floors for their "dry yard" to "pop out" their beans on. In this way they can keep the beans perfectly clean and free from lumps of hard dirt and small stones, which cannot be taken out by a fanning mill or screens. Such a floor can be made cheaply in sections, say 8 feet wide and 16 feet long, by nailing rough boards planed on one side to 2 x 4 scantling set on edges, to allow air and rain to pass underneath. These sections can be easily moved by wagon. In case of rain the unpopped beans can be raked into one or more piles on part of the floor, and the other section used to cover them. When the bean season is over they can be used for other purposes, say storehouse for grain, etc., or shelter for animals, and the next season for dry yard floor, and so on. It will probably pay to paint the floor with cheap black paint; black "draws the sun," which will quicken the "popping out" process. The paint will preserve the wood and also prevent the rain from soaking into the floor, thus enabling the farmer to spread his beans again much sooner after the rain is over. No doubt the extra money received for the castor bean will soon pay the entire cost of the floor.

After the beans begin to ripen, the field should be gone over once or twice a week until frost. In hot, dry weather, they ripen more rapidly than in cool, wet weather. Children can perform this work, and a large family of children cannot be more profitably employed

than in taking care of a crop of castor beans. The work is all light. With a steady horse, children might do all the work.

FROSTED BEANS.

Are worth from one-half to two-thirds the price of good beans, but must never be mixed with them when sent to the market, as a very few frosted beans in a lot of good will reduce the value very much, from the inability to separate them economically.

YIELD, PRICE, ETC.

The yield will depend much upon the culture bestowed upon the crop, upon the season, and the care exercised in gathering and ripening the seed. From fifteen to twenty-five bushels to the acre is an average yield. Some cultivators will yield considerably more, others less. Farmers will do well to pay attention to this crop, for which a certain demand exists, and at remunerating cash prices. It will pay better than raising cotton, corn, potatoes, wheat, barley, or almost any other farm produce. It is not a difficult crop to get to market, can be taken by team, or sent by railroad, with more profit than most crops, as the value is greater for the same quantity.

Castor beans have proven a profitable crop. Present market price is \$1.25 per bushel.

These directions for the cultivation of castor beans are intended to apply to our latitude. It is thought they are sufficiently explicit to enable any one to successfully attempt their culture.

We wish again to urge the farmers and dealers to thoroughly clean their castor beans before shipping to market. Well-cleaned beans will always bring more, and it is a disadvantage to all but the railroad company to pay the freight on dirt, chaff and hulls.

Castor beans weigh 46 pounds per bushel. The principal markets for us are New York City and St. Louis. The freight rate per 100 pounds in bags or barrels is 79 cents.

There are fixed charges for *inspecting* castor beans in bulk as follows: two dollars (\$2.00) for every bulk car or part bulk car; two (2) cents per sack for every car sacks; three (3) cents per sack on less than carload lots, and that *no* inspection be less than twenty-five (25) cents.

GRADES OF CASTOR BEANS.

Prime Beans are such as are bright and uninjured, and weigh not less than forty-one (41) pounds to the measured bushel when cleaned.

Number 2 Beans are such as are bright and uninjured by rain, weight not less than thirty-eight (38) pounds to the measured bushel when cleaned, and shall be valued at five (5) per cent. less than the value of prime beans.

Rejected Beans are such as are slightly damaged by rain, and weight not less than thirty-eight (38) pounds to the measured bushel when cleaned.

No Grade Beans are such as are badly damaged by rains or damaged by frost, or weighed less than thirty-eight (38) pounds to the measured bushel when cleaned.

AMERICUS, GA.

THE EFFECT OF DIFFERENT TEMPERATURES IN THE EXTRACTION OF TANNING MATERIALS.¹

BY J. GORDON PARKER, PH.D., AND H. R. PROCTER, F.I.C.

In this investigation the authors have endeavored to find what ratio the tannin² in various tanning materials bears to the coloring matter, and how the same is affected by extracting at different temperatures.³ It will be found, on comparing our figures, that many tanning materials part with their tannin and coloring matter much more readily at about 60° C. than at higher temperatures, and that almost every one has its own peculiarities in this respect. To extract the tanning and coloring matters a suitable quantity of the tanning material in moderately fine powder was placed in a beaker, at the bottom of which was some pure silver sand, into which a syphon filter was inserted. The beaker was now put into a water-bath, and the material covered with distilled water and allowed to macerate for about sixteen hours, after which the bath was heated so that a thermometer inside the beaker reached the required temperature, and the extraction commenced; the liquor, as it syphoned slowly over, being replaced by water of the same temperature as that required for extraction, which percolated through the material, so that a litre was extracted in from two and one-half to three hours.

¹ Abstracted by J. C. Peacock, from the *Journal of the Society of Chemical Industry*, July 31, 1895.

² "Tannin" is used throughout the paper in the sense of "tanning matters" absorbed by hide-powder.

³ It will be apparent to the pharmaceutical reader, that what applies here to tanning materials may be equally true of many official drugs and their preparations, notably the infusions.—[*Ed. AM. JOUR. PH.*]

It was found that this was practically sufficient water to extract all the available tannin and color, very small additional quantities being obtained when, for experiment, a second litre was percolated at the same temperature.

The solution was now allowed to cool, filtered, analyzed, and measured in a half-inch cell by Lovibond's tintometer, and the results calculated for a half per cent. solution of tanning matter. The total colors are expressed numerically in terms of standard glasses. The analyses for tannin were made by the hide-powder filter method.

The method of extraction was in each case identical, so that the results obtained may be compared with one another, while, for the sake of accuracy, it was found necessary to make at least three extractions at each temperature, stating our results as the mean of the three analyses. Our first experiments were made with a somewhat poor sample of Belgian oak bark, 40 grammes of the ground material being extracted as described above, at each of the ten temperatures given in the subjoined table. Besides this, the following materials were estimated by working on decoctions made from 12 grammes—myrabolans, Smyrna valonia (beard), and Greek valonia (cup and beard); while from Natal mimosa (black wattle), sumach, quebracho wood and mangrove bark (species uncertain, but thought not to be *Rhizophora mangle*) decoctions were prepared representing 20 grammes of the material in the litre.

The results are tabulated in percentage of the highest amount of tanning and coloring matter obtained.

Scanning the table, it will be seen that all the available tannin cannot be extracted by cold water. In the case of oak bark a second litre was extracted at 15° and also at 50°, but they only resulted in getting less than another 0.25 per cent. out of the material, showing that the extraction had been thorough. It will be noticed that 38.1 per cent., or more than one-third more tannin, is extracted at 80°–90° than in the cold, but that the proportion of color to tannin has also increased 35.8 per cent. It may, therefore, be necessary, where color is a primary object, to continue to use cold extraction for oak bark, but it is well to realize that one-third of the tannin is then wasted.

With myrabolans the best results as regards tanning matter are obtained at from 90°–100°, whereas the maximum color is got by actual boiling. It is important to notice that the color is very little

Extraction of Tanning Materials.

TEMPERATURE OF EXTRACTION. DEGREES C.	Oak Bark.		Myrtobolus.		Smyrna Valonia.		Greek Valonia.		Natal Mimosa.		Sunnach.		Quebracho Wood.		Mangrove Bark.	
	Tannin.	Color.	Tannin.	Color.	Tannin.	Color.	Tannin.	Color.	Tannin.	Color.	Tannin.	Color.	Tannin.	Color.	Tannin.	Color.
15	61.9	57.4	79.2	97.4	70.5	74.6	64.0	67.3	66.2	51.1	70.0	63.6	35.0	71.3	61.6	64.7
15-30	70.7	64.5	83.6	82.5	74.5	78.0	72.4	70.0	90.6	54.2	86.7	51.8	46.5	68.7	76.3	69.8
30-40	83.5	76.1	89.8	82.7	86.2	76.2	84.4	68.0	94.0	56.5	91.1	51.8	54.4	65.2	82.4	71.7
40-50	84.2	80.0	93.0	84.4	86.2	74.6	94.4	65.9	94.4	61.8	99.0	52.9	69.5	60.0	87.7	73.8
50-60	87.6	84.0	96.4	87.6	100.0	76.2	99.2	71.6	95.0	79.9	100.0	56.5	76.0	60.4	96.2	72.8
60-70	95.5	92.7	96.6	89.3	99.0	84.7	100.0	75.8	98.4	81.6	93.6	66.6	80.0	59.9	94.7	90.0
70-80	95.7	98.7	96.8	94.1	99.5	84.7	98.4	82.3	100.0	85.5	99.1	72.8	88.0	67.4	96.7	82.8
80-90	100.0	93.2	97.4	96.7	95.0	84.7	96.0	85.8	96.2	93.8	83.2	82.7	100.0	74.3	100.0	73.8
90-100	100.0	94.6	100.0	97.0	94.0	90.6	94.4	92.0	94.0	100.0	81.7	87.7	89.8	100.0	95.7	100.0
Boiled one-half hour.	93.7	100.0	98.1	100.0	90.6	100.0	88.8	100.0	91.8	98.4	74.8	100.0				

affected by the temperature, 97 per cent. of the total color being extracted by cold water, and the lowest amount of color in proportion to tanning matter being obtained at about 40°.

Smyrna valonia behaves in rather a peculiar manner. On increasing the temperature from 15° to 40°, the non-tannins were found to steadily decrease with a corresponding increase in the tannins, which points to a probable transformation of some anhydrides or glucosides into tannin. 50°–60° appears to be the best temperature for the extraction of this material, as at higher temperatures the proportion of color increases, and the tannin decreases. As would naturally be expected, the Greek valonia behaves in a very similar way to the Smyrna, and gives the best results between 60° and 70°. It, however, gives off its tannin more quickly than the Smyrna beard.

The maximum yield of tanning matter from sumach was found to be obtained at 50°–60°, while Messrs. Seymour, Jones and Palmer, who first drew attention to the matter, found it between 30° and 40°, a result which was confirmed by Mr. J. T. Wood. This difference may be due either to some peculiarity in our sample or to a difference in the manner of experimenting, and needs further inquiry. It seems probable, from the increase in non-tannins, corresponding to the diminished yield of tannin at higher temperatures, that some actual decomposition takes place. The extractions made over 60° were extremely difficult to filter, and, on standing, continued to deposit, whereas those extracted at a lower temperature remained quite clear.

It will be noted that, even in the case of quebracho wood, where heat is essential to good extraction, the maximum yield of tannin is obtained below 100°, while the color increases by over 25 per cent. between 90° and 100°. It is highly probable that in this case there is an actual conversion of some of the tannins into red anhydrides, similar to that which has been observed in other catechol tannins.

In the case of mangrove bark, the maximum yield of tannin is practically reached at 60°, while beyond this the tannin remains nearly steady, and the color increases very irregularly up to 100°. It was noted that above 40° the infusions became turbid on cooling, through deposits of difficultly soluble reds, and that over 60° they became very difficult to filter.

THE OCCURRENCE OF TRIMETHYLENE GLYCOL AS A BY-PRODUCT IN THE GLYCERIN MANUFACTURE.¹

BY ARTHUR A. NOYES AND WILLARD H. WATKINS.

During the past winter our attention was called to an unusual difficulty experienced by one of the soap-making firms in the neighborhood of Boston, in obtaining their glycerin of the required commercial gravity. The information furnished in regard to it indicated the presence in the glycerin of some uncommon impurity, and a considerable quantity of the "light stuff" having been generously placed at our disposal by the soap company, we were enabled to investigate it. It was submitted to fractional distillation, first at diminished and then at ordinary pressure, and a liquid boiling between 214° and 217° at 760 mm. pressure was thus separated from it. This liquid was found to have a specific gravity of 1.056 at $\frac{20}{15}^{\circ}$, and gave the following results on analysis :

0.2293 gramme substance gave 0.3998 gramme carbon dioxide and 0.2158 gramme water.

	Found.	Calculated for $C_3H_8O_2$.
Carbon	47.52	47.37
Hydrogen	10.46	10.53

The substance is, therefore, trimethylene glycol, which has a boiling point of 214° and a specific gravity, at $\frac{18}{0}^{\circ}$, of 1.0526. The isomeric propylene glycol boils at 188°-189°, and has a specific gravity of 1.0403 at $\frac{19.4}{0}^{\circ}$. The "light stuff" contained a very considerable proportion, about 38 per cent., of glycol.

The origin of the glycol is a matter of considerable interest. There is little doubt that it was produced by fermentation of the glycerin.

For it has already been shown by Freund² that trimethylene glycol is, in fact, one of the principal fermentation products of that substance. It is, moreover, highly probable that the glycol was present in the fat before saponification by the alkali, as the fermentation can hardly have taken place in the soap lye, both on account of its saline character, and on account of the short time intervening between the

¹ Read at the Springfield Meeting of the American Chemical Society, 1895, and printed in the Journal of that Society, 17, 890.

² Monatsh. Chem., 2, 638.

saponification and the recovery of the glycerin. It had probably been produced in the fat by spontaneous saponification and subsequent fermentation of the glycerin¹. Refuse house fat formed a considerable part of the soap stock.

The presence of glycol in glycerin, used for making nitro-glycerin, might be a source of danger, since it reacts with nitric acid with explosive violence. Its presence would be detected in the usual examination by a low specific gravity accompanied by a high oxidation equivalent, as shown by the bichromate titration.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON, MASS.

A statement of *The Mineral Products of the United States* has been compiled by the Geological Survey at Washington, covering the calendar years 1885 to 1894.

The largest production of pig iron was in 1890, when it aggregated 9,202,703 long tons, valued at \$151,200,410. The product in 1894 aggregated 6,657,388 tons, valued at \$65,007,247. The largest production of silver was in 1892, when 63,500,000 troy ounces were reported, of the coinage value of \$82,099,150. In 1894, the figures were 49,501,122 ounces, valued at \$64,000,000. The largest production of gold was in 1894, when 1,910,816 troy ounces were reported, with a coinage value of \$39,500,000. The next largest was in 1886, when the product was 1,881,250 troy ounces, valued at \$35,000,000. In 1893, the number of troy ounces was less than the product of 1886 by 142,169 troy ounces, but the value was greater by \$950,000. Aluminum shows the largest increase of any of the metals reported, having risen from 283 ounces in 1885, valued at \$2,550, to 550,000 ounces in 1894, valued at \$316,250. Tin does not appear until 1891, when 125,289 pounds are reported, valued at \$25,058. A slight increase in tin product and value is shown in 1892, a decrease in 1893, and none is reported in 1894.

Bituminous coal product was largest in 1893, being 128,385,231 long tons. The product in 1894 fell off nearly 10,000,000 tons. Anthracite coal also had the largest output in 1893, being 48,185,306 long tons, valued at \$85,687,078. In 1894, the product was 46,358,144 long tons, valued at \$78,488,063.

The production of borax was largest in 1894, being 14,680,130 pounds, valued at \$974,445.

The largest value of metallic products of all kinds was reached in 1892, when it aggregated \$307,716,239. The same year showed the largest value of non-metallic minerals of all kinds, the amount being \$339,900,715, the figures for 1894 being, respectively, \$218,168,788 and \$308,486,774.

¹Mr. E. Twitchell, of Cincinnati, informs us that he has found the glycol present in considerable quantity in the "tank liquor," separating from the fat before saponification.

EDITORIAL.

STATISTICS ON PEPPERMINT.

An item on the foregoing subject has been going the rounds of the daily papers, and, in order to verify it, a copy was mailed to the well-known Michigan peppermint grower, Albert M. Todd, who sent the following, which may well replace the above-mentioned clipping :

"Regarding the item, of which you sent me a copy, relating to peppermint culture, most of the statements are approximately correct. The yield of oil of peppermint in Michigan will be about 150,000 pounds this year. Ordinarily, about 350 pounds of half-dried American peppermint plants produce 1 pound of oil. The average yield per acre for a period of twenty years, for the first two years after planting, has been, I should say, about 12 pounds per annum. It has sometimes greatly exceeded this, and sometimes fallen short, on account of frost, drought, and other causes. The crop suffered greatly this year from the two causes mentioned, yet, owing to increased area planted, there was a good amount produced.

"I have not calculated closely the area under cultivation to peppermint this year, but would estimate both 'old' and 'new' crops combined to be from 12,000 to 15,000 acres.

"There was a greater quantity of inferior oil of peppermint produced this year than usual, since the 'old' crop was largely cut down by frost and drought, which permitted the growth of weeds, and, under careless cultivation in some localities, the quality was poor."

THE PHARMACEUTICAL REVIEW.

The *Pharmaceutische Rundschau*, of New York, which was founded thirteen years ago by Dr. Frederick Hoffmann, will appear on January 1, 1896, as the *Pharmaceutical Review*, and will, for the most part, be printed in the English language.

Dr. Hoffmann will not, for the present, entirely withdraw, but his name as editor will appear along with that of Dr. Edward Kremers, of the University of Wisconsin. The names of the following well-known pharmaceutical writers will appear on the title-page as co-operators: Professor Charles Caspari, Jr., Professor Charles O. Curtman, Professor J. U. Lloyd, Dr. Charles Mohr, Dr. F. B. Power, Professor A. B. Prescott, Professor William Simon.

The new journal will be issued by the Pharmaceutical Review Publishing Company, of Milwaukee, Wis.

In the thirteen years of its existence, the *Pharmaceutische Rundschau* has established a well-earned reputation for fearlessly expressing an opinion on the various pharmaceutical questions that have arisen, regardless of sentiment or policy. The *Pharmaceutical Review* will, no doubt, continue in this course, and, at the same time, publish some results of original research.

Dr. Hoffmann will sail for Europe about January 1, 1896, to obtain a year of much-needed rest and recreation. The winter will be spent in the mild climate of southern Europe.

THE PRESENT STATUS OF THE ANTITOXIN TREATMENT OF DIPHTHERIA.

In a recent issue of the *University Medical Magazine*, Vol. 8, p. 126, this subject is treated editorially, and, after giving a mass of statistics, the following conclusions are reached :

"A careful weighing of all the evidence submitted upon the subject up to the present time seems to establish the following facts: That antitoxin is a curative agent far more efficacious in diphtheria than any remedy heretofore employed; that its injection is very rarely followed by serious local disturbances, such as abscess, and, perhaps, never when the preparation is pure and employed under antiseptic precautions; that a marked improvement in both the local and general symptoms of diphtheria is noticeable within twenty-four to forty-eight hours after the injection of the serum; that the antitoxin has a decided influence in preventing the spread of the false membrane into the larynx and trachea; that the earlier in course of the disease the serum is employed the more favorable are the results; that it is distinctly more efficient in the fibrinous types of the disease than in the septic ones; that the liability to paralysis and albuminuria is not lessened by the use of serum, but probably somewhat enhanced thereby; that genuine nephritis, on the other hand, is less frequently observed in cases of diphtheria treated with antitoxin than with other remedies; that antitoxin may produce certain untoward symptoms, such as various cutaneous rashes, but that these are not serious in their nature and are unattended with danger to life; and that improvement in the methods of preparing the serum and more definite knowledge as to the manner of its employment have rendered the later reports even more favorable to its use than the earlier ones."

AN UNCALLED-FOR FLING.

The *Therapeutic Gazette* for November 15, 1895, contains an article by Leedom Sharp, L.L.B., M.D., on "Opium Poisoning Treated with Caffeine," in which occurs the following paragraph, a part of which we have italicized:

"The length of time elapsing from the taking of the opium, which was in the form of Dover's powder—*compounded by the druggist hastily and carelessly*, no doubt—to the time he was given the caffeine was about two hours and a half."

This sentence, which was not constructed according to the long-established rules of Gould Brown or any other grammarian, is not, so far as the statement concerning the druggist is concerned, substantiated by any other part of the article, nor is it in accordance with the facts which are apparent to any one who will take the trouble to read the balance of the paper.

This heavily titled author first tells us that his patient was "aged twenty-seven; a medical student of marked mental attainments and in perfect health, but suffering from hay fever." How the patient could be suffering from hay fever and opium poisoning, yet be in perfect health, will probably not be quite clear to laymen; but we think we know what the author intended.

We then learn that the patient arrived at the physician's office at 5.30 A.M., two hours after he had swallowed fifteen grains of Dover's powder. Now if the stomach of that medical student "of marked mental attainments" was as it should have been at 3.30 A.M., it was empty, and any tyro in therapeutics knows that if the fifteen grains of Dover's powder had not produced a marked impression under those circumstances, the drug and druggist both might have been the subjects of some suspicion. But the drug was of the full strength and weight, and this heavily titled physician, without stopping to discuss that, says: "I gave him immediately nitro-glycerin, $\frac{1}{50}$ grain; tr. digitalis, 4

minims ; tr. strophanthus, 4 minims ; tr. belladonna, 5 minims," and, as if that were not enough, he "hurriedly administered 6 grains of caffeine." The result of this multifold treatment was the survival of the patient, in spite of adverse circumstances, and the enthusiastic physician sat down to write up the case in the most glowing terms. He gave all the credit to himself and the caffeine, and at the same time he hastily and carelessly endeavored to blacken the reputation of some unoffending pharmacist who had been doing his duty. The author, however, neglected to state that he administered the caffeine hypodermically ; we presume that was what he did ; but if he did not, the contribution has no excuse whatever for its existence, for caffeine, as the active constituent of infusion of coffee, has, for a long time, been successfully employed in opium poisoning.

Finally, this man of many titles did not state why this medical student "of marked mental attainments" was pouring medicine down his throat at 3.30 A.M., when he ought to have been in bed asleep ; he did not say whether the patient had been trying to increase the action of the Dover's powder by the free ingestion of hot drinks, and he did not even suggest what he would have done if his patient had not had "marked mental attainments."

We thought to extract a grain of comfort from the final paragraph, however, when we read that the patient "probably would have survived the ingestion of the fifteen grains of the powder," but we suddenly remembered that it is usually not the *ingestion* which kills ; he had survived that before he reached the doctor's office.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A TREATISE ON PHARMACY FOR STUDENTS AND PHARMACISTS. By Charles Caspari, Jr., Ph.G., with 288 illustrations. Philadelphia : Lea Brothers & Co. 1895. Pp. 679. Cloth, \$4.50.

A new book on pharmacy is always a matter of considerable interest to pharmacists. This is the second one that has been issued within a year, besides the revised edition of a third one.

We are told in the preface that "the motive for writing this book was, in the main, to supply students of pharmacy with a text-book which, while sufficiently comprehensive to serve as a trustworthy guide, should be devoid of all unnecessary material, such as official and unofficial formulas, etc., readily accessible in the Pharmacopœia and such books of reference as are usually found in drug stores."

The book is divided into three parts: Part I comprises General Pharmacy. Part II treats of Practical Pharmacy. Part III is devoted to Pharmaceutical Chemistry.

Part I opens with a chapter on each of the following subjects: Pharmacopœias, Weights and Measures, Specific Gravity, Heat, Collection and Preservation of Crude Drugs ; then such operations as grinding, solution and percolation are considered. Part II considers the various classes of official preparations, like Waters, Infusions, Fluid Extracts, etc., and, after a general treatment of the group, the members are arranged alphabetically, and the composition of each is given. The chapter on Mixtures in this part contains

some pertinent remarks on incompatibility, which is considered pharmaceutically, chemically and therapeutically, and practically exhausts the subject. Part III is divided into inorganic and organic substances. The classification of the former is probably as good as could be devised in a strictly pharmaceutical treatment, but the author introduces the organic substances with a chapter on cellulose. We are aware that in doing this he has followed the practice of a number of pharmaceutical writers who have preceded him; but the classification is as unscientific as it is unaccountable, and belongs to the ideas existing in the early part of this century, that cellulose was a fundamental kind of matter. This order of treatment is all the more remarkable because cellulose is not of any great pharmaceutical importance, and one recent author has seen fit to omit it altogether from his work on pharmacy.

The various chapters in the organic part, are creditably presented, notably the one devoted to the alkaloids, in which an excellent brief description is given of the class in general, and of the more important individual members of the class.

As a whole, the book is a well-written, compact statement of the science of pharmacy, and will be found of value by students as well as by the general pharmacist. The typography, illustrations and whole make-up of the work are a credit to the publishers.

BULLETIN, VOL. II, NO. 4, College of Agriculture, Imperial University of Japan.

In this number Dr. Oscar Loew continues his contribution on *The Energy of the Living Protoplasm*, as previously noticed in this Journal (1894, p. 412, and 1895, p. 179); the special considerations this time being *The Chemical Activity of Living Cells and Respiration*. The other contributions in this number are: *On the Reserve Protein in Plants*, II, by G. Daikubara; *On the Consumption of Asparagine in the Nutrition of Plants*, *On the Assimilation of Nitrogen from Nitrates and Ammonium Salts by Phænogams*, *On the Presence of Asparagine in the Root of Nelumbo nucifera*, and *On the Occurrence of Two Kinds of Mannan in the Root of Conophallus konyaku*, by Y. Kinoshita; *Note on the Chemical Composition of Some Mucilages*, by K. Yoshimura; *The Preparation and Chemical Composition of Tofu*, and *Note on Nukamiso*, by M. Inouye; *Preliminary Note on Sake Yeast*, by K. Yabe; *Note on the Behavior of Hippuric Acid in Soils*, by K. Yoshimura; *Does Hydrogen Peroxide Occur in Plants*, by J. Cho.

APPENDIX TO DUNGLISON'S MEDICAL DICTIONARY. Lea Brothers & Co., Philadelphia, 1895.

This is a supplement to the twenty-first edition, and consists of twenty-five pages of the most recent medical terms. Many of the new remedies of synthetic origin are defined, and also many of those substances which were first made official in the U. S. P., 1890.

INDEXES TO THE LITERATURES OF CERIUM AND LANTHANUM. By W. H. Magee, Ph.D. Washington: published by the Smithsonian Institution, 1895. 8vo, 43 pp. From Smithsonian Miscellaneous Collections, Vol. 38 (Number 971).

INDEX TO THE LITERATURE OF DIDYMIUM, 1842-1893. By A. C. Langmuir, Ph.D. Washington: published by the Smithsonian Institution, 1894. 8vo, 20 pp. From Smithsonian Miscellaneous Collections, Vol. 38 (Number 972).

ON THE DENSITIES OF OXYGEN AND HYDROGEN, AND ON THE RATIO OF THEIR ATOMIC WEIGHTS. By Edward W. Morley, Ph.D. Washington: published by the Smithsonian Institution, 1895. 4to, 117 pp. From Smithsonian Contributions to Knowledge, Vol. 29 (Number 980).

The following from the announcement by Secretary Langley fully explains the scope of the work:

"The present memoir is the result of a series of investigations by Professor Morley, which have been aided to some extent during the past two years by the Smithsonian Institution.

"In his investigation, Professor Morley has studied the problem by two methods:

"(1) By the synthesis of water, in which he, for the first time, has achieved completeness by actually weighing the hydrogen, the oxygen, and the water formed, whereas all his predecessors took one or another of these factors by difference.

"(2) By the density ratio between oxygen and hydrogen. In this method he has weighed the gases of greater purity and in larger quantity than hitherto, and he has in some instances operated without the intervention of stopcocks, and therefore with no possibility of error due to leakage. He has also, as a correction to the density ratio, redetermined the composition of water by volume. By both methods he reaches the same result:

"O = 15.879, with variation in the *fourth* decimal place as between the two."

AN ACCOUNT OF THE SMITHSONIAN INSTITUTION: ITS ORIGIN, HISTORY, OBJECTS AND ACHIEVEMENTS. By G. Brown Goode. Washington, 1895. 38 pp.

Any one interested in the rise and development of the Smithsonian Institution cannot but be entertained by a perusal of this pamphlet.

PROCEEDINGS OF THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION. Eighteenth Annual Meeting, 1895. We believe that more original papers are printed in the proceedings of this association than in those of any other State in the Union, and, probably, we would not be far wrong to say, more than occur in the proceedings of all the other States combined. The present volume is fully up to the average in this respect, and it has been made attractive in other ways by the liberal distribution of illustrations through the book, of the scenery near the meeting place at Eaglesmere. The frontispiece is a portrait of the late Edward C. Jones.

PROCEEDINGS OF THE FLORIDA PHARMACEUTICAL ASSOCIATION. Ninth Annual Meeting, 1895. The most important paper in this volume is by Dr. J. B. Read, on the *History and Therapeutical Value of the Saw Palmetto*.

PROCEEDINGS OF THE GEORGIA PHARMACEUTICAL ASSOCIATION. Twentieth Annual Meeting, 1895. The most interesting and important paper of the volume is on *The Cultivation of the Castor Oil Bean*, which we reproduce in full, on page 624 of this issue.

PROCEEDINGS OF THE TWENTY-FIFTH ANNUAL MEETING OF THE NEW JERSEY PHARMACEUTICAL ASSOCIATION, held in Newark, 1895. The most notable paper is one on *The Pharmacology of Saw Palmetto*. By Henry H. Rusby, W. A. Bastedo and Virgil Coblenz.

PROCEEDINGS OF THE ELEVENTH ANNUAL MEETING OF THE MINNESOTA PHARMACEUTICAL ASSOCIATION, held at Lake Minnetonka, 1895.

PROCEEDINGS OF THE NEW YORK STATE PHARMACEUTICAL ASSOCIATION, 1895. The most important paper is on *Fluid Extract of Wild Cherry*. By George V. Dillenbach.

IN MEMORIAM, JOHN ADAM RYDER. Published by a committee of representatives from the American Philosophical Society, Academy of Natural Sciences, and the United States Commission of Fish and Fisheries. 28 pp.

A GUIDE TO THE ORGANIC DRUGS OF THE U. S. P., 1890. Compiled and arranged by John S. Wright. Presented to students of pharmacy by the Botanical Department of Eli Lilly & Company, Indianapolis, Ind. 118 pp.

FOSFATO LIQUIDO DI FERRO E CALCIO. Nota del Dottor G. Siboni. Reprint from *Bolletino Chimico-Farmaceutico*. September, 1895.

OXYHÆMOGLOBIN AND ALLIED PRODUCTS. Published under the direction of F. E. Stewart, M.D., Ph.G., director of the Scientific Department of F. Stearns & Co. Detroit, 1895.

This contribution is divided into three parts: Part I, Oxyhæmoglobin, Albuminate of Iron, and Peptonate of Iron, by F. E. Stewart. Part II, The Absorption of Iron in the Animal Body, by A. B. Macallum. Part III, The Hæmoglobins and Related Products of the Market, by Charles H. Williams.

ON THE TECHNICAL ANALYSIS OF ASPHALTS. By Samuel P. Sadtler, Ph.D. Reprinted from the *Journal of the Franklin Institute*, November, 1895.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, November 19, 1895.

The second regular Pharmaceutical Meeting was held in the Museum of the College. On motion, Mr. Joseph W. England was chosen chairman. The minutes of the previous meeting were adopted as published, with the exception of one correction which was made by Mr. Kebler. He said that the use of talcum, instead of calcium phosphate, in the official process for making the tincture of opium, does not interfere with the yield of morphine.

Prof. Trimble showed a sample of Acetum Opii, which was presented by Mr. G. H. Davis, of this city, and was made over thirty years ago by the U. S. Pharmacopœia of 1850. The clear liquid had been separated from the sediment, which was in large proportion, and which was thought to be composed principally of the aromatics used in the preparation. Prof. Trimble is having this analyzed, and will report on the percentage of morphine separated. Mr. England remarked that vinegar of opium has fallen into disrepute among physicians, which is probably to be regretted, as acetic acid is one of the best solvents for the alkaloid.

Prof. Trimble also showed a sample of Aloin which was presented by Mr.

C. H. LaWall, and one of genuine Turkey Rhubarb purchased in the London market in 1856, the latter being from Prof. Remington's cabinet.

Mr. England inquired which aloin the sample was, and Mr. LaWall said that it was a combination of the official aloins.

The chairman exhibited two Kola plants, which had been grown in the conservatory of the Philadelphia Hospital, through the courtesy of Superintendent Charles Lawrence, from seeds (both white and red), which he had procured from Messrs. Frederick Stearns & Co., and upon his invitation Prof. Bastin gave a description of the genus to which these plants belong. Prof. Bastin said that not much was known of these plants until 1865, or still later when Messrs. Heckel and Schlagdenhauffen published their investigation of them. They belong to the *Kola acuminata* or *Sterculia acuminata*, which is a member of the order Sterculiaceæ. The members of this order are mostly shrubs, but some are trees and some vines.

The genus *Sterculia* is indigenous to tropical Africa or the western Soudan, but now grows wild in Venezuela and the West India Islands, and has been naturalized in Australia and on the southeastern coast of Africa.

The plants are evergreen trees or shrubs. The leaves are acuminate and alternate, and those which are mature are smooth, while the younger ones are covered with a stellate pubescence which is a peculiarity of the *Sterculia* or *Kola*.

The flowers are yellow and form corymbose clusters. They have but a single floral envelope, which consists of a five-sepaled calyx, and are monœcious. Prof. Bastin also mentioned some other peculiarities of the plants, and then referred to some of the uses of the seeds.

In the Jamaica exhibit at the World's Columbian Exposition, preparations of Kola seed, made to resemble the commercial preparations of chocolate and cocoa, were shown. The commissioner in charge said that they were used instead of the more expensive preparations of similar character, and were more nutritious than chocolate and not inferior to it in taste.

Prof. Bastin thought that this latter statement, coming from an interested person, should be accepted with a grain of salt, but that it is altogether probable that this commodity will become an important article of commerce in the near future.

Mr. Procter wished to know of Prof. Bastin whether he considered the fresh seed superior to the dry for making the preparations, as is stated by some manufacturing firms, and remarked that he had gotten good results with the dry seeds. Prof. Bastin thought well to suspend opinion until further investigation of the subject had been made. Prof. Trimble said that the astringency is due to 2 or 3 per cent. of tannin which is not as great as that of tea. He also referred to the probable danger of the "kola habit," which may be attributed to the popularity attained by this drug through advertising.

Mr. Kebler then read a paper entitled *Tubular Crystals of Monobromated Camphor*, in which he described many peculiar forms of crystals, such as those of quartz and galena, and those obtained by artificial means or in the process of manufacture. Prof. Bastin also mentioned the peculiarity of the quartz crystal, and stated the fact that it usually contains a cavity and a vacuum bubble, the latter being dissipated at a temperature of 400° or 500°, and that this temperature is regarded as an indication of the temperature at which the quartz crystal was formed.

The next paper, on *Agar-Agar as a Base for Glycerin Suppositories*, was read by Prof. F. G. Ryan, and was the cause of considerable discussion. Samples of suppositories made with agar-agar, containing respectively 50 per cent. and 75 per cent. of glycerin, were shown, as was also a sample of agar-agar.

Mr. Procter said that he had found difficulty in the official process for this preparation and that he used twice the quantity of glycerin there directed, which gave a satisfactory product.

Mr. England recommended the use of anhydrous glycerin when the quantity is increased.

Mr. Beringer said that the heat of the water-bath is not sufficient in this operation, but that a low flame is to be preferred, and he further stated that he uses sodium bicarbonate instead of the carbonate which contains water of crystallization. He also recommended keeping the suppositories in a container having a paraffined cork, as cork alone is not impervious to moisture, and it is liable to stain the suppository unless protected in this way, or the difficulty may be obviated by placing paraffined paper underneath the cork.

Mr. Procter gave a suggestion in regard to dispensing them. His method is to dispense them in glass vials, each suppository having a string running underneath it for its removal from the vial. The string projects by the side of the cork, and they are both paraffined.

Several other practical points were brought out in the discussion, in which Messrs. Ryan, Beringer, Remington and England participated.

On motion of Prof. Trimble, a vote of thanks was tendered those who had presented specimens.

The papers were referred to the Publication Committee, and, on motion, the meeting adjourned.

T. S. WIEGAND,
Registrar.

The *Antidotes for Hydrocyanic Acid* have been recently discussed in a paper by Dr. John G. Spenser, before the Cleveland Medical Society. Mechanical antidotes, as emetics and stomach tubes, are of no value, since enough time is lost in their application to allow of the absorption into the blood of a quantity of hydrocyanic acid sufficient to produce fatal results.

The Hungarian toxicologist, Johan Antal, has recommended cobaltous nitrate as an efficient antidote, which has led Dr. Spenser to institute a series of experiments on rabbits and dogs. Cobalt salts appear to be poisonous in concentrated solution; one gramme in a five per cent. solution killed a rabbit in seven hours, whereas the same amount in a one per cent. solution had no bad effect. The author concludes that the antidote is of doubtful practicability, for, in the case of a two per cent. acid, death is so rapid that the antidote should be close at hand and used with all dispatch. If this be done, it will certainly react well and prove to be the nearest to an ideal antidote yet proposed.

It is suggested to inject 20 to 30 c.c. of a one-half per cent. solution subcutaneously, to counteract the effect of the poison already in the circulation, and to give several tumblerfuls by the mouth to neutralize any of the poison yet in the stomach.

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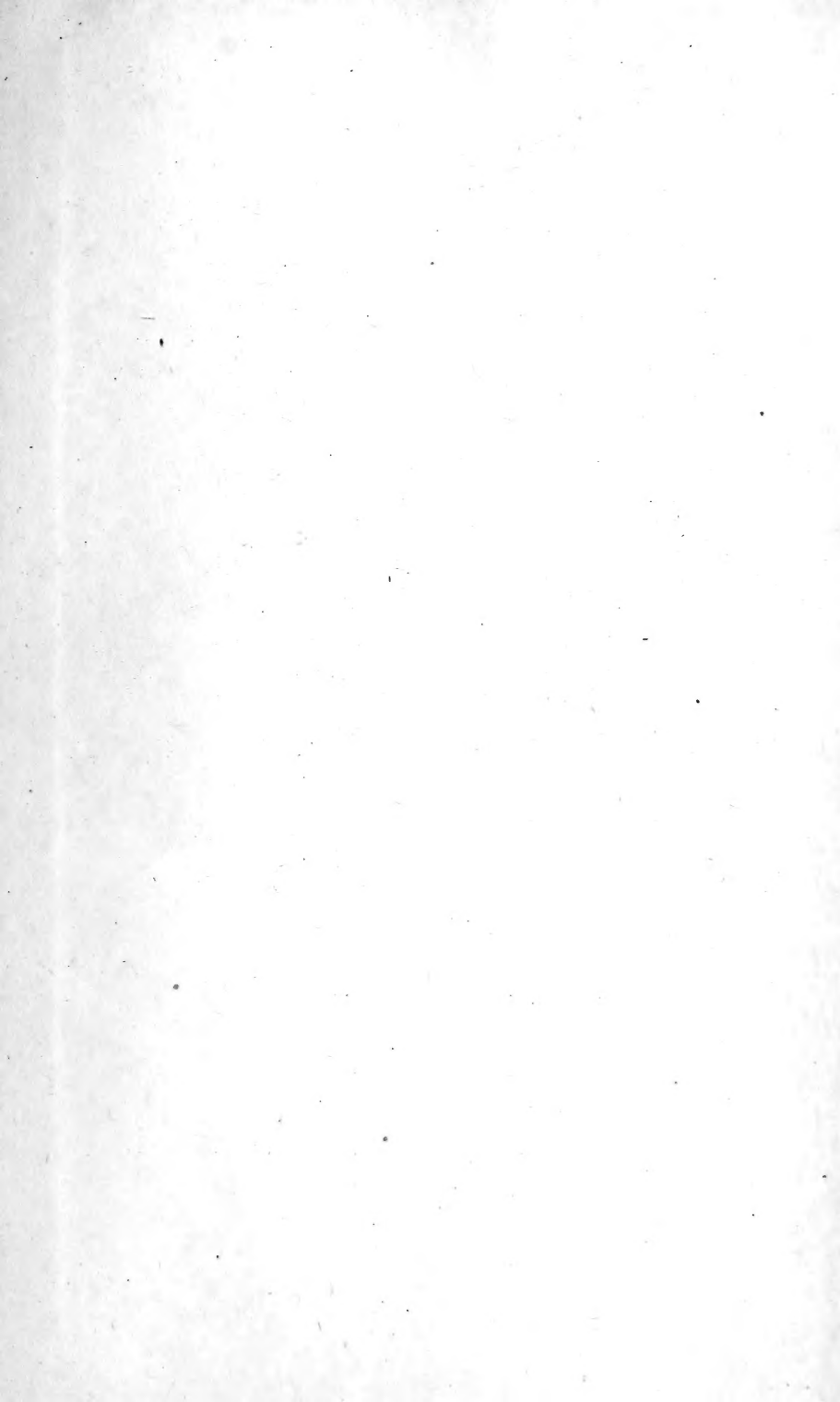
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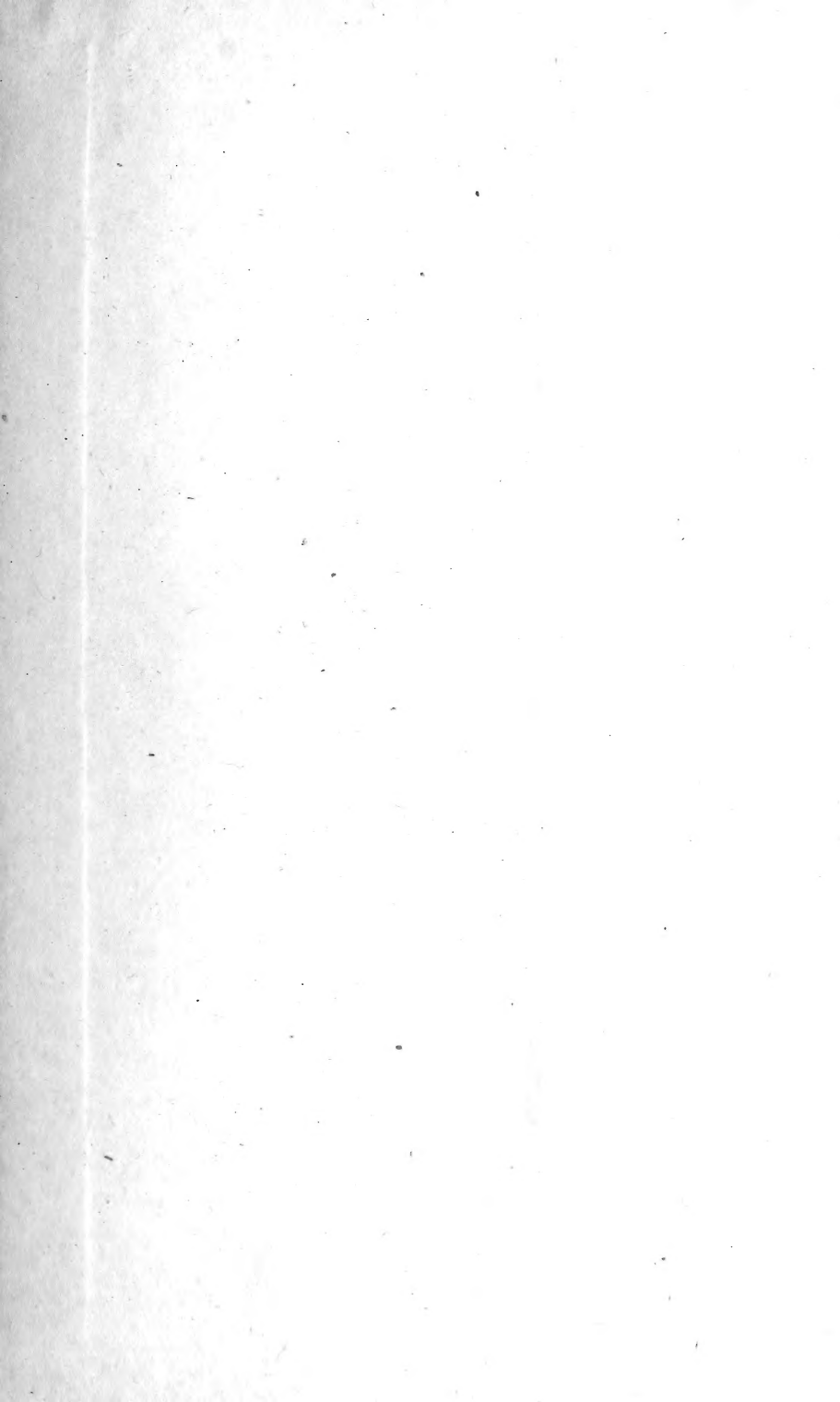
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